SOUTHWEST ALASKA
TRANSPORTATION PLAN

FREIGHT IMPACT ANALYSIS OF POTENTIAL ALASKA PENINSULA ROADWAY SEGMENTS AND REGIONAL FREIGHT MOVEMENT SUMMARY

TECHNICAL MEMORANDUM

prepared for the

Alaska Department of Transportation and Public Facilities

prepared by

Parsons Brinckerhoff

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EXECUTIVE SUMMARY

Building and rehabilitating selected roadway linkages in the Southwest Alaska study area has the potential to save millions of dollars a year in freight movement costs. Because of its remoteness, skeletal surface transportation infrastructure, and challenging weather and topography, Southwest Alaskans experience some of the nation's highest freight movement costs. These costs impose significant constraints on residents' quality of life and on their communities' and region's ability to develop and support a stable, diversified economic base.

This report quantifies the probable freight movement savings achievable by implementing selected surface transportation alternatives developed as elements of the Southwest Alaska Transportation Plan. Put simply, this reports answers the following question: "About how much money would be saved in freight shipment costs if given surface transportation links were built in the Southwest Alaska study area?"

This report is not a stand-alone document. It analyzes alternatives developed and documented in an earlier deliverable, Southwest Alaska Transportation Plan Description of Alternatives Technical Memorandum (August 1999). This report described a number of "packages" of transportation improvements and projects that encompass marine, roadway, and aviation freight and passenger transport. Only a subset of the packages developed is subjected to the freight movement analysis reported herein. In fact, only those packages that contain new or rehabilitated roadway linkages are subjected to the freight movement analysis.

The roadway links proposed as part of this transportation plan, and which are the subject of the freight movement analysis are summarized very briefly below:

- **Cook Inlet to Bristol Bay Corridor**. This alternative would provide a surface transportation link between Cook Inlet and Bristol Bay. In so doing, this alternative would improve access and mobility for many communities in the study area, including Pedro Bay, Nondalton, Iliamna, Newhalen, Igiugig, Levelock, Naknek, King Salmon, Dillingham and Aleknagik--providing for them for the first time a well developed surface transportation link to the Kenai Peninsula, Anchorage, and the state's primary road network. This option is provided in conjunction with ferry service from Homer to Williamsport. Significant navigational improvements at Williamsport, including channel dredging, are key to this package.
- **Alaska Peninsula Roadway (Northern Portion)**. This alternative would provide an overland route extending southwest from Naknek, along the Alaska Peninsula's northern coast to its southern terminus at Port Heiden. In so doing it would bridge the Naknek River, connecting the communities of Naknek and South Naknek, then pass through Egegik, spur east to Ugashik, and proceed south again through Pilot Point, finally reaching Port Heiden.
- **Alaska Peninsula Roadway (Southern Portion)**. This alternative would begin where the Northern Portion of the Alaska Peninsula Roadway leaves off: at Port Heiden. From Port Heiden, this alternative would connect with a roadway system linking the three Chigniks: Chignik Lagoon, Chignik Lake, and Chignik. From the Chigniks, the roadway would proceed south to Perryville, ultimately terminating at Ivanof Bay.

If built, these alternatives are expected to have significant impacts on the costs and logistics of regional freight movement. Being able to truck goods from study area ports including Chignik and Williamsport, as opposed to having to barge them all the way around the Alaska Peninsula

or fly them in from Anchorage, would be far less expensive than under current routing and mode splits.

It is possible to determine just how much less expensive by forecasting future volumes of cargo consumption, estimating current rates under the existing infrastructure and by estimating future rates under the proposed roadway linkages, which are much lower. The remaining packages of transportation alternatives; that is, the ones that do not contain new roadway links, are summarized below:

- **Dedicated *Tustumena***. This alternative would remove the *Tustumena* from service in Prince William Sound and dedicate her to service in Southwest Alaska. The same study area ports as are currently served by the AMHS would be served under this alternative. Desire for improved AMHS service to the region has been expressed through the Southwest Alaska Transportation Plan Advisory Committee and through resolutions issued by the Southwest Alaska Municipal Conference. Two variations on the theme of a dedicated *Tustumena* have been explored. The first has a service schedule that would make *two* trips every four weeks out the Aleutians. The other has a service schedule that would make *one* trip out the Aleutians every four weeks.

- **Bristol Bay Marine Service**. This alternative would provide new ferry service to link the Bristol Bay communities of Togiak, Dillingham, Clark's Point, Naknek and Egegik. The vessel envisioned would be a shallow-draft landing craft, and service would be provided between May and October.

- **Intra-Kodiak Island Alternative**. This alternative would utilize a passenger-only ferry approximately 150 feet long to serve Kodiak Island's coastal communities, including Ouzinkie, Women's Bay, Chiniak, Old Harbor, Akhiok, Karluk, Larsen Bay, Uganik and Port Bailey.

- **Airport Improvements**. An analysis of study area airports was conducted to determine whether existing capital facilities' runways and safety areas are adequate to meet projected passenger and cargo demand. This analysis revealed airport needs that can be categorized into three levels of priority. The first priority is to improve runways at airports where runways are not long enough to support current aircraft needs, which is the case at Unalaska, whose 3,900' long runway should be lengthened to 5,700' to support the larger aircraft that are already being flown into this airport. The next priority would be to lengthen to 3,000' those runways that are not long enough to support anticipated needs over the planning horizon (2020). The study area airports in this category are Levelock, New Stuyahok and Ouzinkie. These airports' runways range from 1,800' 2,085' feet. In terms of planning for the purpose of meeting passenger and cargo demand, the third priority would be to bring to standard the remaining study area runways that are under 3,000'.

These "non-roadway" packages, which contain only marine and aviation improvements, are not subjected to the freight movement analysis because they are not expected to have significant freight movement impacts. Ferry service is not currently, and is not expected to be a significant player in regional freight movement. By large margins, commercial marine shipping and barge companies are able to move goods into and through the region more quickly and less expensively than the AMHS. Mission, service frequency, speed, and number of transfers required are among the reasons for commercial shippers' cost advantages. Likewise, the aviation improvements proposed as part of this regional transportation plan are not expected to have significant freight movement impacts—at least not at the level of analysis supportable by available data.

As noted in the recap of alternatives, the aviation improvements proposed would lengthen selected study area runways. Increasing runway length allows airports to accommodate larger planes that can carry larger amounts of cargo, presumably at a lower unit cost. However, any freight movement cost savings achieved through lengthening runways would be marginal and discernible only at the microeconomic level. In contrast, the projects that involve roadway links are anticipated to spark large-scale modal shifts. Accordingly, cost differences at a much higher level of magnitude are also anticipated. Moreover, the level of precision that would be required to assess the economic impacts longer runways far exceeds the precision of available study area data.

At the heart of the analysis are estimates of current and forecast consumption of goods, including petroleum products. Existing freight movement costs and modal splits (e.g., the percentage of goods by volume carried by commercial marine and air shipment, respectively) are also estimated. These estimates are inputs into the calculation of total freight movement costs into the future under existing conditions; that is, given the existing freight movement infrastructure. In order to compare these costs with the costs that would be incurred if given links were developed, separate rate calculations and mode splits are modeled under specified changes in the freight movement infrastructure. This changed infrastructure entails roadway linkages among a number of study area communities and between these communities and major marine ports. These rate and mode split estimates are then applied to the forecast volumes. The end result is a comparison of total freight movement costs under existing conditions versus under total freight movement costs under the specified surface transportation improvements.

The freight movement impact of any individual link is very much a function of how many other contiguous links are implemented. The number of possible combinations of individual links that might be implemented at any point in time is very high. For this reason, it would not have been feasible to assess the economic impact of every possible combination of links. For simplicity, two separate scenarios were explored. Under **Scenario 1**, it is assumed that under all proposed roadway links, along with ferry service between the Kenai Peninsula and the Alaska Peninsula are implemented. Under **Scenario 2**, it is assumed that only select elements of the Cook Inlet to Bristol Bay Corridor are implemented: namely, the navigational improvements at Williamsport and rehabilitation of the existing road and bridges between Williamsport and Pile Bay.

Reported below are the end results of the freight movement analysis for Scenario 1 and Scenario 2, respectively. The methodology used to derive these results, as well as the data upon which they are based, are documented in the body of this report.

Table ES-1
Scenario 1.
Estimated Annual Freight Movement Cost Savings (2020)
(All Proposed Roadway Links Implemented)

	Estimated Freight Movement Costs		Estimated Savings
Cargo Type	**2020 Costs Incurred Under Existing Conditions**	**2020 Freight Movement Costs Incurred under Scenario 1 Surface Transportation Improvements**	
Petroleum	$2,007,100	$1,298,500	**$708,600**
"Other" Cargo	$23,510,100	$14,093,900	**$9,416,200**
Gillnet Vessel Costs			**$1,082,500**[1]
TOTAL ESTIMATED FREIGHT MOVEMENT COST SAVINGS			**$11,207,300**

Table ES-2
Scenario 2.
Estimated Annual Freight Movement Cost Savings (2020)
(Williamsport Improvements Alone)

	Estimated Freight Movement Costs		Estimated Savings
Cargo Type	**2020 Costs Incurred Under Existing Conditions**	**2020 Freight Movement Costs Incurred under Scenario 2 Surface Transportation Improvements**	
Petroleum	NA	NA	**NA**
"Other" Cargo	$4,904,200	$2,837,400	**$2,066,800**
Gillnet Vessel Costs			**$1,082,500**
TOTAL ESTIMATED ANNUAL FREIGHT MOVEMENT COST SAVINGS			**$3,149,300**

[1] *Navigation Channel Feasibility Report and Environmental Assessment, Williamsport*, US Army Corps of Engineers, Alaska District, December 1995.

INTRODUCTION

This report explores the probable freight movement impacts of selected surface transportation alternatives developed in conjunction with the Southwest Alaska Transportation Plan. Put simply, this reports answers the following question: “About how much money would be saved in freight shipment costs if given surface transportation links were built in the Southwest Alaska study area?” At the heart of the analysis are estimates of current and forecast consumption of goods, including petroleum products. Existing freight movement costs and modal splits (e.g., the percentage of goods by volume carried by commercial marine and air shipment, respectively) are also estimated. These estimates are inputs into the calculation of total freight movement costs into the future under existing conditions; that is, given the existing freight movement infrastructure. In order to compare these costs with the costs that would be incurred if given links were developed, separate rate calculations and mode splits are modeled under specified changes in the freight movement infrastructure. This changed infrastructure entails roadway linkages among a number of study area communities and between these communities and major marine ports. These rate and mode split estimates are then applied to the forecast volumes. The end result is a comparison of total freight movement costs under existing conditions versus under total freight movement costs under the specified surface transportation improvements.

The analyses documented in this report reveal that substantial freight movement savings could be achieved by building specified surface transportation links. Estimating the freight movement cost savings achievable by building certain surface transportation improvements provides a means of quantifying a key benefit, which will then be measured against the improvements’ capital and operating costs in a subsequent step of the planning process: the evaluation of alternatives.

To provide a context for the freight analysis of these selected alternatives, three areas are first discussed: (1) the process by which the alternatives were developed; and (2) a brief description of each initial alternative; and (3) an explanation of why certain of the initial alternatives are subjected to the freight analysis while others are not.

The Alternatives Development Process

The first step in developing transportation alternatives for the Southwest Alaska Transportation Plan occurred in summer of 1998 at a meeting of the Southwest Alaska Transportation Plan Advisory Committee, where key regional transportation system deficiencies were identified. The next steps in the alternatives development process have involved researching, developing, refining, and specifying service concepts with which to address these deficiencies. An initial list of alternatives was described in an August 1999 report, *Description of Alternatives Technical Memorandum*. In subsequent discussions among the ADOT&PF, the consultant team, and Advisory Committee members and Southwest region residents and business leaders, additional links and projects have been added to the refined list. Most notable among the additions are airport improvements at four study area communities and a new roadway link between Dillingham and the larger proposed regional network. The purpose of this particular report is to explore the freight movement impacts of those alternatives with the greatest potential to alter regional costs, mode splits, and logistics.

Recap of the Alternatives

The refined list of alternatives for the Southwest Alaska Transportation Plan includes eight packages of projects. A brief summary of each package follows.

1. **Baseline Alternative**. The baseline alternative includes all capital projects programmed in the Statewide Transportation Improvement Program (STIP). Examples of projects comprising the baseline alternative include a bridge crossing the Wood River at Aleknagik, a small boat harbor project in Chignik, and runway extension and resurfacing projects in Cold Bay, Egegik and Sand Point. The purpose of including the baseline alternative in the plan is to provide a basis against which to evaluate the costs and benefits associated with the plan's "build" alternatives.

2. **Cook Inlet to Bristol Bay Corridor**. This alternative would provide a surface transportation link between Cook Inlet and Bristol Bay. In so doing, this alternative would improve access and mobility for many communities in the study area, including Pedro Bay, Nondalton, Iliamna, Newhalen, Igiugig, Levelock, Naknek, King Salmon, Dillingham and Aleknagik--providing for them for the first time a well developed surface transportation link to the Kenai Peninsula, Anchorage, and the state's primary road network. Four separate options for making this link are considered. Two of these options are overland-only options, one of which would connect Williamsport to King Salmon, and the other of which would connect Williamsport to King Salmon. The other two options have in common a road from Williamsport to Pile Bay, with the rest of the distance to Bristol Bay being provided by marine service. One of these "combination" options uses Hovercraft, while the other uses a shallow-draft landing vessel. All four options are provided in conjunction with ferry service from Homer to Williamsport.

3. **Alaska Peninsula Roadway (Northern Portion)**. This alternative would provide an overland route extending southwest from Naknek, along the Alaska Peninsula's northern coast to its southern terminus at Port Heiden. In so doing it would bridge the Naknek River, connecting the communities of Naknek and South Naknek, then pass through Egegik, spur east to Ugashik, and proceed south again through Pilot Point, finally reaching Port Heiden.

4. **Alaska Peninsula Roadway (Southern Portion)**. This alternative would begin where the Northern Portion of the Alaska Peninsula Roadway leaves off: at Port Heiden. From Port Heiden, this alternative would connect with a roadway system linking the three Chigniks: Chignik Lagoon, Chignik Lake, and Chignik. From the Chigniks, the roadway would proceed south to Perryville, ultimately terminating at Ivanof Bay.

5. **Dedicated *Tustumena***. This alternative would remove the *Tustumena* from service in Prince William Sound and dedicate her to service in Southwest Alaska. The same study area ports as are currently served by the AMHS would be served under this alternative. Desire for improved AMHS service to the region has been expressed through the Southwest Alaska Transportation Plan Advisory Committee and through resolutions issued by the Southwest Alaska Municipal Conference. Two variations on the theme of a dedicated *Tustumena* have been explored. The first has a service schedule that would make *two* trips every four weeks out the Aleutians. The other has a service schedule that would make *one* trip out the Aleutians every four weeks.

6. **Bristol Bay Marine Service**. This alternative would provide new ferry service to link the Bristol Bay communities of Togiak, Dillingham, Clark's Point, Naknek and Egegik. The vessel envisioned would be a shallow-draft landing craft, and service would be provided between May and October.

7. **Intra-Kodiak Island Alternative**. This alternative would utilize a passenger-only ferry approximately 150 feet long to serve Kodiak Island's coastal communities, including Ouzinkie, Women's Bay, Chiniak, Old Harbor, Akhiok, Karluk, Larsen Bay, Uganik and Port Bailey.

8. **Airport Improvements**. An analysis of study area airports was conducted to determine whether existing capital facilities' runways and safety areas are adequate to meet projected passenger and cargo demand. This analysis revealed airport needs that can be categorized into three levels of priority. The first priority is to improve runways at airports where runways are not long enough to support current aircraft needs, which is the case at Unalaska, whose 3,900' long runway should be lengthened to 5,700' to support the larger aircraft that are already being flown into this airport. The next priority would be to lengthen to 3,000' those runways that are not long enough to support anticipated needs over the planning horizon (2020). The study area airports in this category are Levelock, New Stuyahok and Ouzinkie. These airports' runways range from 1,800' 2,085' feet. In terms of planning for the purpose of meeting passenger and cargo demand, the third priority would be to bring to standard the remaining study area runways that are under 3,000'.

It is important to note that the three "packaged" alternatives involving roadway links actually comprise some 16 separate roadway links between discrete communities. These alternatives are (1) the Cook Inlet to Bristol Bay Corridor; (2) the Alaska Peninsula Roadway (Northern Portion); and (3) the Alaska Peninsula Roadway (Southern Portion).

The freight movement impact of any individual link is very much a function of how many other contiguous links are implemented. The number of possible combinations of individual links that might be implemented at a given time is very high. For this reason, it would not have been feasible to assess the economic impact of every possible combination of links. For simplicity, two separate scenarios were explored. Under **Scenario 1**, it is assumed that under all proposed roadway links, along with ferry service between the Kenai Peninsula and the Alaska Peninsula are implemented. Under **Scenario 2**, it is assumed that only select elements of the Cook Inlet to Bristol Bay Corridor are implemented: namely, the navigational improvements at Williamsport and rehabilitation of the existing road and bridges between Williamsport and Pile Bay.

Selection of Alternatives for Freight Movement Analysis

Not all eight of these alternatives are subjected to the freight movement analysis reported herein. Only the first four alternatives--those that contain roadway links--are analyzed. Those alternatives that focus exclusively on marine and aviation alternatives are not analyzed for their freight movement impacts. Separate reasons underlie the exclusion of marine and aviation alternatives. These reasons are discussed below.

WHY THE AMHS ALTERNATIVES ARE EXCLUDED FROM THE FREIGHT ANALYSIS

The reason for this exclusion is that alternatives that entail AMHS service alone are not expected to have appreciable freight movement impact. Ferry service is not, and is not expected to be a significant player in marine freight movement. Commercial carriers simply do not perceive AMHS in its current capacity as a competitor for marine shipment (Terry Hart, Alaska Northbound Marketing Director, personal communications, October 1999). This is due to several factors, including the following:

- Compared to commercial marine shippers, AMHS vessel have very little capacity. For example, while the vessels used in Sea-Land's Alaska service have capacity for about 400 vans, the *Tustumena* can only accommodate in the neighborhood of eight vans.
- Given that they make multiple port calls, AMHS vessels are relatively slow cargo conveyors compared to commercial marine service providers.
- As a non-competing freight carrier, AMHS is not oriented to providing high-volume, highly efficient logistical capability. For instance, while commercial carriers often arrange for the delivery of goods from ship or barge to its ultimate destination, AMHS does not offer full-service shipping services.
- Most goods shipped to Southwest Alaska originate in Seattle/Tacoma, not Anchorage. Even if they did originate in Anchorage, they would still have to be transported overland to the current ferry terminal at Homer since AMHS does not currently operate out of Anchorage. Costs accompany each modal transfer. In contrast, commercial carriers can sail directly to Southwest Alaska from Seattle, or they can proceed to Southwest Alaska following a brief stop in Anchorage to unload goods.

In sharp contrast, the three alternatives that do include new roadway linkages are expected to have considerable impacts on freight movement within the study area. If built, the Cook Inlet to Bristol Bay Corridor, the Trans-Alaska Peninsula (Northern Portion) and Trans-Alaska Peninsula (Southern Portion), would constitute a regional surface transportation network that provide the infrastructure necessary to support a modal alternative to marine and air freight shipment. Trucking, as opposed to barging, shipping or flying cargo is distinctly different in terms of the time, costs, and logistics involved. Simply put, the real differentiator is between trucking and barging—not between ferry and barging. In short, the reason that only the alternatives that involve roadway links are subjected to the freight analysis reported herein is because it is only those alternatives that are expected to have an impact on regional freight movement and economic development.

WHY THE AVIATION ALTERNATIVES ARE EXCLUDED FROM THE FREIGHT ANALYSIS

As noted in the recap of alternatives, the aviation improvements proposed would lengthen selected study area runways. Increasing runway length allows airports to accommodate larger planes that can carry larger amounts of cargo, presumably at a lower unit cost. However, any freight movement cost savings achieved through lengthening runways would be marginal and discernible only at the microeconomic level. In contrast, the projects that involve roadway links are anticipated to spark large-scale modal shifts. Accordingly, cost differences at a much higher level of magnitude are also anticipated. Moreover, the level of precision that would be required to assess the economic impacts longer runways far exceeds the precision of available study area data. Statistically speaking, any measure of improvement would be overwhelmed by the width of the "confidence interval" surrounding such findings. In short, while the data support the economic analysis of introduction of a new and very different freight transportation mode, they do not support the analysis of the freight movement impacts of lengthening a runway.

Bethel
Kuskokwim Bay
Koliganek
New Stuyahok
Ekwok
Goodnews Bay
Twin Hills
Aleknagik
Platinum
Togiak
Dillingham
Manokotak
Portage Creek
Ekuk
Clark's Point
Naknek
King Salmon
South Naknek
Egegik
Bristol Bay
Pilot Point
Ugashik
Port Heiden
Saint Paul
Pribilof Islands
Saint George
Nelson Lagoon
Port Moller
Perryville
Ivanof Bay
Chignik
Chignik Lagoon
Chignik Lake
Cold Bay
King Cove
Sand Point
Unga
False Pass
Akutan
Unalaska
Nikolski
Scale 1:3500000
0km 100km 200km
0mi 100mi
N
W
E
S
Iliamna
Nondalton
Newhalen
Port Alsworth
Pedro Bay
Kokhanok
Igiugig
Levelock
Homer
Seldovia
Port Graham
Kenai
Port Lions
Ouzinkie
Kodiak
Karluk
Larsen Bay
Old Harbor
Akhiok
A
A
Approximate scale: 1:10,000,000
Attu
Shemya Station
Aleutian Islands
Adak Station
Atka
A
A

TRANSPORTATION & PUBLIC FACILITIES
STATE OF ALASKA

HDR Alaska
PB 100 YEARS

File:	Date:	By:
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- Cook Inlet to Bristol Bay Corridor
- Kodiak Inter-Island Ferry
- Dedicated Tustumena Service
- Southern Peninsula Road System
- Northern Peninsula Road System
- Bristol Bay Ferry
- Winter Trail Markers
- Study Corridors
- Existing Roads
- Regional Hubs

Area of Map

Data Sources:
Alaska Department of Labor
Alaska Department of Natural Resources
Alaska Department of Transportation
Federal Aviation Administration
US Army Corps of Engineers

Southwest Alaska Transportation Plan

Initial Transportation System Alternatives Technical Memorandum

STUDY AREA DATA AVAILABILITY

Three challenging tasks had to be accomplished in order to quantitatively estimate the impacts of the roadway links proposed as elements of Scenarios 1 and 2: (1) documentation of existing freight movement patterns in the region--by mode, volume, direction, and commodity type; (2) development of freight demand forecasts by community and basic commodity type for the 2020 design year; and (3) development of a methodology with which to compare aggregate freight movement costs under both existing conditions and under the proposed infrastructure improvements. Each of these tasks was made difficult by the paucity of detailed and complete data on commodity flows by type, volume, seasonal split, shipping cost, or mode within the study area.

To the author's knowledge this report reflects the first instance in which available primary data sources for different modes have been assembled in a single document to support comparative analyses. To the author's knowledge, no systematic study of freight movement in Southwest Alaska has ever been undertaken. While this report constitutes an effort to more accurate, empirically based understanding of the region's freight patterns and needs, the scope of the planning effort precluded the additional primary data collection that would have been necessary to develop a suitably detailed understanding of how freight moves into, out of, and around the region.

Even where data are available, problems exist in terms of their comparability. For example,

- While the US Army Corps of Engineers (COE) Waterborne Commerce Statistics Department collects data on marine shipments to and from Chignik, the Federal Aviation Administration (FAA) does not collect data on airborne cargo for this community. In fact, "complete" data sets, that is, COE, FAA, and AMHS, are only available for a handful of communities.
- While the COE data on marine shipments specify both origin and destination, the FAA reports only "freight enplaned."
- While the COE reports the basic type of commodity shipped by sea, no specification of any kind of airborne cargo is available in FAA data, nor in the AMHS data.
- None of the available sources provide any indication of the value of goods shipped.

Insofar as these fairly disparate data sources had to be combined in order to develop a single, multimodal picture of overall volumes moved, mode split, and other measures, the level of specificity was determined by the "lowest common denominator." From the data it was possible to determine how much freight, in aggregate, is handled in Southwest Alaska; mode split by volume, and gross breakdowns of commodity type. Additional manipulations were used to develop a sense of freight movement in the many smaller communities for which no data at all are available. These analyses are discussed in Part 3. Because of the many gaps in the data, the discussion and findings reported herein have had to be built on the basis of numerous assumptions. Although these assumptions are based on the best information currently available (absent a major new data collection effort), there is no denying that changing one or more assumptions could change the outcome significantly. As such, the findings reported herein should be taken for what they are—a conceptual, planning-level estimate of costs and benefits.

Because understanding the nature, sources, and limitations of the data upon which the report is based is so important to interpretation of the results, the report begins with a discussion of the data sources themselves. Three major source types were used to gain an understanding of freight movement in Southwest Alaska: (1) published primary sources; (2) unpublished primary

sources, namely, in-person and telephone interviews with representatives of shipping companies operating in Alaska; and (3) published secondary sources.

PRIMARY SOURCES

Published Sources

Compilation by mode of the "raw" data needed to establish existing freight movement patterns in the region had already been carried out in an earlier deliverable for this planning effort, "Southwest Alaska Existing Conditions Technical Memorandum," April 1998. This document reported statistics gathered by the Federal Aviation Administration, the US Army Corps of Engineers Waterborne Commerce Statistics Division, and the Alaska Marine Highway System.[2] The nature and type of data provided by each of these sources are summarized in Table 1. These data are at the core of the freight demand forecasting process and for the analysis of freight movement impacts attributable to the selected surface transportation alternatives.

[2] AMHS provided the consultant team with access to its computerized database, which includes information on the volume of freight vans carried, by sailing, origin, and destination.

Table 1.
Primary Sources of Freight Movement Data for Southwest Alaska

Freight Mode	Primary Sources	Type of Data	SW Communities for which data are available
Air Freight[3]	Federal Aviation Administration: 1. Airport Activity Statistics of Certificated Route Air Carriers 2. Commuter Air Carrier Activity	• Tons of enplaned mail and cargo from 1987-95 for certificated route air carrier; from 1988 to 1996 for small certificated and commuter air • Enplaned tons are tons put on the airplane at the given location carriers	Cold Bay, Dillingham, Iliamna, King Cove, King Salmon, Kodiak, Port Heiden, St. George, St. Paul, Sand Point, Togiak, Unalaska
AMHS Freight[4]	AMHS Database	• Van volumes by number and van length • Origin and destination for all ports served by AMHS	Chignik, Cold Bay, False Pass, King Cove, Kodiak, Port Lions, Sand Point, Unalaska

Private Marine Freight	US Army Corps of Engineers, Waterborne Commerce Statistics Center	• Incoming and outgoing tonnage by freight category:
		  • Petroleum and petroleum products
		  • Durable goods
		  • Fish and fisheries products
		  • All other commodities 1986 to 1994
			Chignik, Cold Bay, Dillingham, Egegik, False Pass, Iliamna, King Cove, King Salmon, Kodiak, Naknek, Old Harbor, Port Heiden, Port Lions, St. George, St. Paul, Sand Point, Togiak, Unalaska

[3] Data on cargo and mail shipped via air are available from the Federal Aviation Administration /Bureau of Transportation Statistics (BTS) from two sources: 1*) Airport Activity Statistics of Certified Route Air Carriers* and 2) *Commuter Air Carrier Activity*. These data provided the tons of enplaned mail and cargo from 1987 to 1995 for certified route air carrier, and from 1988 to 1996 for small certified and commuter air carrier freight. For this analysis, data from more recent years was used, that is, 1990 to 1995 for certified route air carrier and 1990 to 1996 for small certified and commuter air carrier. The data (for both cargo and mail) from these data sets were summed for each year to develop an annual average for each airport. The data are collected as enplaned tons; i.e., cargo put on the airplane at the given location.

[4] Data on freight movement via AMHS were available from the AMHS Database, which provides van volumes, including each van's length in feet, by origin and destination. Van volumes were converted to a tonnage unit based on length. To convert feet to tons, each foot was multiplied by 650 for total pounds, then divided by 2000. The authors acknowledge that this equivalent is imprecise, since vans' weights are not measured or recorded. Nonetheless, the 650-pound figure is a conservative estimate the reference for which is *TRB Special Report 223,* "*Providing Access for Large Trucks,*" 1989, p.177. Data were available for each year from 1988 to 1997. For this analysis, data was averaged for the more recent years of 1992 to1996, because the data set for 1997 appeared incomplete.

Table 2.
Freight Movement Summary
for Southwest Alaska

Community	FREIGHT MOVEMENT MODE					Total Tonnage
	Air	AMHS Vans		Private Marine		
	Combined Air (tons of cargo & mail enplaned)	Origin	Destination	Total Average (incoming tons)	Total Average (outgoing tons)	Total Reported
Akutan				8,300	11,200	19,500
Chignik		11	2	9,800	1,500	11,313
Cold Bay	782	8	29	3,100	900	4,819
Dillingham	4,372			10,900	7,300	22,572
Egegik				400	1,100	1,500
False Pass		4	0	300	100	404
Iliamna	1,255			0	0	1,255
King Cove	44	0	0	7,100	4,500	11,644
King Salmon/Naknek	5,413			19,800	23,600	48,823
Kodiak & Surrounding	3,516	770	845	252,900	304,800	562,831
Old Harbor				600	700	1,300
Port Heiden	119					119
St. George	59					59
St. Paul	181					181
Sand Point	185	2	6	9,100	100	9,393
Togiak	118					118
Unalaska	1,272	15	11	312,700	436,100	750,098
Total	17,326	810	893	635,000	791,900	1,445,929

Interviews

Another key source of primary data were in-person and telephone interviews conducted with representatives of Alaska Airlines, PenAir, ERA Aviation, Everts Air Fuel, Samson Tug and Barge, Crowley Marine Services, Bush Consolidators, Northland Transportation, Coastal Marine Transportation, Coastal Freight and Salvage, Iliamna Transportation Company, Harkness Enterprises, Sea-Land, Airland and Carlile Transportation. These interviews elicited the carriers' views as to the probable pricing and service level effects of the alternatives proposed in this planning effort. These representatives also served as a "sounding board" in terms of the reasonableness of the methodology established to assess the freight movement impacts of the proposed alternatives.

In addition to the shippers and consolidators, a useful resource was found in Dennis Niedermeyer, who is employed by the Lake and Peninsula School District in which role he manages the district's capital projects. The projects are scattered throughout the Borough (whose boundaries, incidentally, incorporate almost all of the communities that would be linked by the Trans-Peninsula Roadway System). His work puts him in a unique position in terms of experiencing firsthand the difficulties and high costs associated with getting a wide range of goods, including building materials, heavy machinery, and petroleum products, to construction sites. His firsthand knowledge provides insight into the cost of moving goods to and within the region by type, mode, community, direction, and season.

Niedermeyer was able in several respects to provide a unique perspective, one that shippers were not always able to provide. For instance, Niedermeyer was able to provide candid rate estimates. The shipping companies contacted were, virtually without exception, circumspect about revealing rates for contract shipments. They attribute their reticence to two primary factors: (1) that revealing their rates would give their competition useful intelligence which would then be used to compete against them; and, (2) that revealing rates in a public document could open shippers up to charges of price gouging and other undesirable public scrutiny. The shippers did provide broad rate ranges, but anonymously. To the extent that shippers were used to estimate rates, under existing conditions, and under the hypothetical situation involving the proposed roadway system, multiple shippers were contacted and rate quotes were generally averaged to strive for as much validity in those rate quotes as feasible. Another reason that Niedermeyer's input was helpful is that shippers appeared to be familiar with only their mode and market niche, whereas Niedermeyer was able to provide a more accurate overview of freight shipment across commodity types and modes.

SECONDARY SOURCES

As noted, available primary sources in Southwest Alaska are limited in their ability to illuminate the full extent of regional freight movement. Therefore, a literature review was conducted to ferret out bits and pieces of freight movement information—particularly for smaller communities, on which subject the primary sources are completely silent. What we had hoped to find at this point was a clearer indication of how freight moves on to the smaller communities after having reached the marine and aviation hubs for which primary data are collected. Ultimately, this effort simply revealed how little freight movement in the Southwest has been studied. As such, the information uncovered in this literature review was of limited value in painting with even broad brushstrokes a picture of regional freight movement. In any case, listed in Table 3 are the secondary sources referenced in this effort to "fill in the blanks."

Table 3.
Secondary Sources of Freight Movement Data for Southwest Alaska

1. Alaska Department of Transportation and Public Facilities*, Alaska Intermodal Transportation Plan, Appendices A-C*, October 1994.

2. Alaska Department of Transportation and Public Facilities, Division of Planning Central Region, *Nondalton-Newhalen/Iliamna Pioneer Road Economic Feasibility Study*, March 1986.

3. Alaska Marine Highway System Department of Transportation and Public Facilities*, Alaska Marine Highway System Master Plan*, July 1991.

4. Community Planning, *Draft Secondary and Cumulative Impacts Study of the Proposed Iliamna-Nondalton Road Reconstruction.* Alaska Department of Transportation and Public Facilities, September 1996.

5. Department of Community and Regional Affairs, *Community Information Summaries*, downloaded from website www.comregaf.state.ak.us , June 1997.

6. Fried, Neal and Windisch-Cole, Brigitta, "A Trends Profile- The Bristol Bay Region" *Alaska Economic Trends*, July 1997.

7. HDR Alaska Inc., *Draft Assessment of Transportation Need, King Cove-Cold Bay Transportation Improvement Assessment.* Alaska Department of Transportation and Public Facilities, December 1997.

8. Kodiak Chamber of Commerce, *Kodiak Community Profile and Economic Indicators*, 1997.

9. Lake and Peninsula Borough*, Lake and Peninsula Borough FY'95 Transportation Improvement Program Priorities*. Prepared for the Alaska Department of Transportation and Public Facilities, October 1993.

10. Parsons Brinckerhoff, HDR Alaska, the Glosten Associates, Northern Economics, and Ogden Beeman Associates, *Southwest Alaska Transportation Plan- Existing Conditions Technical Memorandum* . Alaska Department of Transportation and Public Facilities, April 1998.

11. TRA-BV Airport Consulting, *Alaska Aviation System Plan Update Appendices.* Prepared for Alaska Department of Transportation and Public Facilities, March 1996.

12. TRA-BV Airport Consulting, *Alaska Aviation System Plan Update Executive Summary.* Prepared for Alaska Department of Transportation and Public Facilities, March 1996.

13. Tryck, Nyman, Hayes, Inc., *Reconnaissance of Navigation Improvements, Western and Arctic Coasts of Alaska, Task 1, 2, & 3.* Prepared for Alaska District Corps of Engineers, August 1997.

14. *Economic Impacts of the Copper River Highway*. Prepared for the State of Alaska Department of Transportation and Public Facilities, by the Institute of Social and Economic Research, University of Alaska, Anchorage, June 1993.

15. *Navigation Channel Feasibility Report and Environmental Assessment, Williamsport*; US Army Corps of Engineers, Alaska District, December 1995.

16. Parsons Brinckerhoff, Northern Economics, and the Glosten Associates, *Southwest Alaska Transportation Plan- Travel Demand Estimates Technical Memorandum* . Alaska Department of Transportation and Public Facilities, September 1998.

OVERVIEW OF FREIGHT MOVEMENT IN SOUTHWEST ALASKA

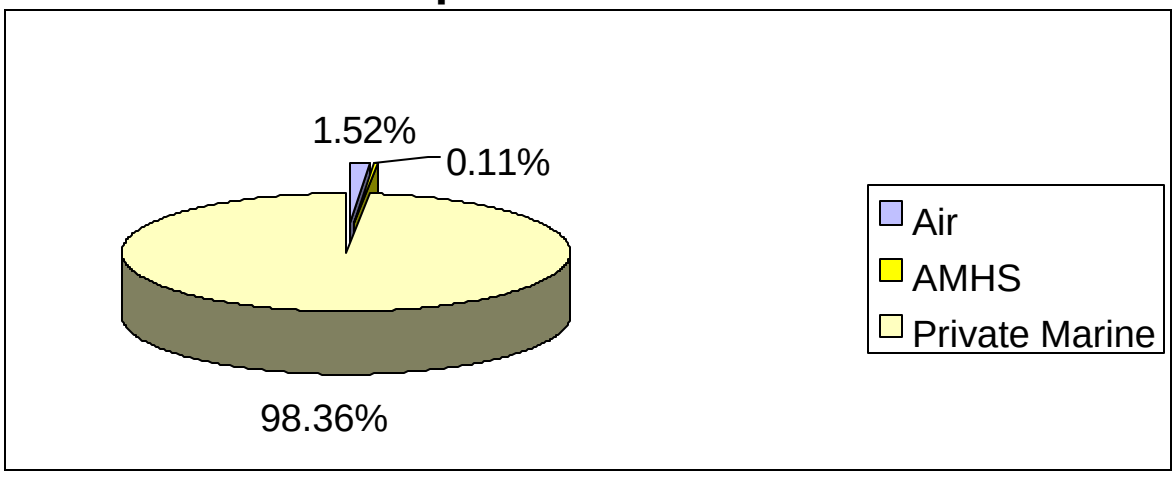
Because manufacturing in the region, outside of fish processing, is extremely limited, virtually everything Southwest Alaskans consume, apart from the subsistence resources they harvest, must be shipped in—by air or by sea. Imports include building materials, machinery, fishing support supplies, groceries and consumer durables.

The vast majority of imports to the region originate not in Anchorage, but in the Puget Sound ports of Seattle and Tacoma. This is due to the fact that (1) Anchorage is a relatively minor manufacturer; and (2) Anchorage has few warehousing facilities, which limits its ability to serve as a transshipment point (Terry Hart, Sea-Land, Alaska Northbound Marketing Director, personal communications, September 23, 1999). In fact, Alaska ranks among the Port of Tacoma's biggest customers.[5] Unalaska, in addition to its role as a major fishing and fish-processing source, serves as a key international transshipment site for Asia-bound goods and ship traffic.

MODE SPLIT

By volume, the vast majority of goods to and from Southwest Alaska are shipped to and through Southwest Alaska by sea via commercial carriers, which include both ships (container and Ro-Ro) and barges. Marine shipping accounts for over 98% of the volume of goods shipped through Southwest Alaska.[6] AMHS freight haul makes up a miniscule percentage (less than 1%) of the region's total freight movement (Figure 1).

Figure 1.
Combined Freight Movement
Mode Split in Southwest Alaska



[5] Both SeaLand and TOTE, the largest Alaskan shippers, operate out of the Port of Tacoma.

[6] Data on private freight marine was available from the US Army Corps of Engineers, Waterborne Commerce Statistics Center. This data included both incoming and outgoing tons for 1986 to 1994 for 4 major categories: 1) petroleum and petroleum products, 2) durable goods, 3) fish and fisheries products, and 4) all other commodities. In analyzing the data it was important to note that in 1990 the Waterborne Commerce Statistics Center changed its data collection methods and started to record data in short tons, so an entry after 1990 of "0" indicates less then 500 short tons were reported. Annual data was averaged for Petroleum, Petroleum Products, Durable Goods, Fish, Fisheries Products, and All Other Commodities for 1986 to 1995.

Marine shipping in Southwest Alaska is challenging because of the region's harsh weather, small populations and relatively undeveloped ports. Winter ice typically prevents any navigation to Bethel and other Bristol Bay ports as well as the northwest coast of the Alaska Peninsula. Small villages must often be served by lightering cargo from barges or small ships to landing craft or small boats. In the Bristol Bay region it is common for barges to be grounded at low tide and to spend a tide cycle on the beach discharging cargo. Barge-mounted cranes are typically used.

There are three primary components to marine shipping in Southwest Alaska:

- The large international shipping fleet represented by Sea-Land Services and American President Lines, both of which call at Unalaska on a weekly basis and transport frozen seafood products to the Far East. Sea-Land serves Kodiak and Dutch Harbor with freight from Seattle; APL only picks up export products for the Far East.

- The specialty ship fleet of Coastal Transportation and Western Pioneer Shipping. Both maintain fleets of small refrigerator ships. They are configured to carry frozen seafood south and general cargo and seafood processing supplies north. Coastal has a fleet of seven ships and Western Pioneer has a fleet of ten. Western also operates a fleet of bulk petroleum barges that distributes refined products from the Alaska Peninsula to Southwest Alaska and other points in Western Alaska.

- The barge operators that operate seasonal common carrier and contract services to Southwest Alaska. The principal barge operators are Northland Services and Samson Tug and Barge. These operators carry the majority of bulky freight to and from the towns and villages of Southwest Alaska. Container and individual items, such as buildings, vehicles, boats, construction equipment, and bulk materials can be transported on the flat deck barges operated by these carriers. Crowley Maritime also operates petroleum barges in the region. These carriers also act as feeder services for the international shippers and gather and distribute freight using Dutch Harbor as the hub. Other hubs include Naknek, Bethel, Sitka, and Kodiak. Sitka and Kodiak are used for transshipment of cargoes moving from Southeast Alaska and Prince William Sound ports.

A feature of marine service to Southwest Alaska is that capacity is quite elastic. Extra voyages can typically be added at the end of the normal season. For long-range projects, extra equipment can be dedicated to a service area. For example, both Western Pioneer and Coastal supplement their service during the peak of the fishing season. Furthermore, contract towing, wherein a customer contracts for a particular service, can provide substantial capacity; particularly for remote areas with only occasional service. Although excess capacity exists, it may not be available to all of the region's remote villages, or even some of its relatively large communities. This is because the fixed cost of making a stop is quite high. Aside from the fuel, and fixed vessel costs for the voyage, there is also the likelihood that a full longshore gang has to be called out—even for a small amount of cargo. One operator even noted that they provide service at a substantial loss during the off-season in order to maintain relationships with customers for the peak season.

Table 5 contains a general schedule for marine service to Southwest Alaska ports. Please note that one item in this table is not up to date. Crowley recently rescinded its regularly scheduled service to Southwest Alaska for 1999, citing declining business, ostensibly related to poor fish harvests in Bristol Bay.

Table 4.
Freight Movement Mode Split
by Southwest Alaska Community

	Combined Air (tons of cargo & mail enplaned)	Combined inbound and outbound AMHS (tons)	Combined inbound and outbound Commercial Marine (tons)	TOTAL FREIGHT MOVED (tons)	% OF TONNAGE MOVED BY AIR	% OF TONNAGE MOVED BY AMHS	% OF TONNAGE MOVED BY COMMERCIAL MARINE
Akutan			19,500.00	19,500.00	0.00%	0.00%	100.00%
Chigniks[6]		13	11,300.00	11,313.00	0.00%	0.11%	99.89%
Cold Bay	782	37	4,000.00	4,819.00	16.23%	0.77%	83.00%
Dillingham	4,372		18,200.00	22,571.50	19.37%	0.00%	80.63%
Egegik			1,500.00	1,500.00	0.00%	0.00%	100.00%
False Pass		4	400.00	404.00	0.00%	0.99%	99.01%
Iliamna	1,255			1,255.00	100.00%	0.00%	0.00%
King Cove	44		11,600.00	11,644.00	0.38%	0.00%	99.62%
King Salmon/Naknek	5,423		43,400.00	48,823.00	11.11%	0.00%	88.89%
Kodiak	3,516	1615	557,700.00	562,831.00	0.62%	0.29%	99.09%
Naknek		0	43,400.00	43,400.00	0.00%	0.00%	100.00%
Old Harbor			1,300.00	1,300.00	0.00%	0.00%	100.00%
Port Heiden	119			119.00	100.00%	0.00%	0.00%
St. George	59			59.00	100.00%	0.00%	0.00%
St. Paul	181			181.00	100.00%	0.00%	0.00%
Sand Point	185	8	9,200.00	9,393.00	1.97%	0.09%	97.95%
Togiak	118			118.00	100.00%	0.00%	0.00%
Unalaska	1,272	26	748,800.00	750,098.00	0.17%	0.00%	99.83%
Total	**17,326**	**1703**	**1,470,300**	**1,489,329**	**1.16%**	**0.11%**	**98.72%**

Note that “complete” mode split data are available only for a small subset of Southwest Alaska communities: Cold Bay, Dillingham, Kodiak, Sand Point, and Unalaska. This is a function of the basis upon which the data are collected. Akutan, as well as the Chigniks, for example, certainly experience some degree of airfreight movement. However, since cargo enplanement data are not available for these communities, it is no possible to ascertain the aviation cargo mode split without additional data collection. Similarly, the absence of marine cargo data for the communities in the Iliamna Lake area is another limitation. Though waterborne commerce statistics from the US Army Corps of Engineers are unavailable for Iliamna, it has been reported in another secondary source that only about 40% of freight is flown into Iliamna, the rest arriving by barge and landing craft (US Army Corps of Engineers, Navigation Channel Feasibility Report and Environmental Assessment, December 1995). The absence of marine cargo data for the communities in the Iliamna Lake area is another limitation.

Table 5.
General Service Schedule for Private Marine Shipping to Southwest Alaska

Carrier	Coastal Transportation	Crowley Marine Services, Inc	Northland Services, Inc	Samson Tug & Barge	SeaLand Service	Western Pioneer	American President Lines
Frequency of Service	Jan 1-Nov 15 Weekly Nov 16-Dec 31 Bimonthly Apr-Aug Twice Weekly	April–September Only	April–September Only	Year-Round Service–Weekly May–September	Year-Round Service	Supplemented During Fishing Season	Year-Round Service
Port							
Akutan	Weekly					Every 10 days	
Aleknagik		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Anchorage		4 times per season	6 times per season		Bi-Weekly		
Chignik	Weekly	2 times per season				Every 10 days	
Clarks Point		3 times per season					
Cold Bay	Weekly					Every 10 days	
Dillingham		7 times per season	9 times per season				
Egegik		2 times per season	4 times per season				
Ekuk			3 times per season				
Ekwok		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
False Pass	Weekly					Every 10 days	
Igiugig			Service provided via Bristol Bay Villages				
Illiamna			Service provided via Bristol Bay Villages				
King Cove	Weekly			Bi-Weekly		Every 10 days	
Kodiak		1 time per season		Bi-Weekly	Bi-Weekly	Every 10 days	
Kodiak Island		3 times per season					
Koliganek		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Larsen Bay						Every 10 days	
Levelock			Service provided via Bristol Bay Villages				
Manokotak		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Naknek		7 times/season (incl. occasional village svc)	9 times per season				
Nelson Lagoon		1 time per season					
New Stuyahok		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Newhalen			Service provided via Bristol Bay Villages				
Old Harbor						Every 10 days	
Ouzinkie						Every 10 days	
Pedro Bay			Service provided via Bristol Bay Villages				
Pilot Point		Village Service provided via Naknek					
Port Heiden		Village Service provided via Naknek					
Port Lions						Every 10 days	
Port Moller		4 times per season				Every 10 days	
Saint Paul	Weekly					Every 10 days	
Sand Point	Weekly		2 times per season			Every 10 days	
Seattle	Weekly	Varies	Varies	Bi-Weekly	Weekly	Every 10 days	
South Naknek		5 times per season					
Togiak			2 times per season				
Ugashik		Village Service provided via Naknek					
Unalaska (Dutch Harbor)	Weekly			Bi-Weekly	Bi-Weekly	Every 10 days	Weekly

**Village service is subject to sufficient cargo*

Commercial Marine Transport

The only mode for which it is possible to determine what commodity is being shipped, as opposed to simply volumes, is commercial marine transport. The statistics collected by the US Army Corps of Engineers Waterborne Commerce Statistics Department are broken down into four broad categories: Petroleum Products (which include gasoline, jet fuel, and industrial lubricants); Durable Goods; Fish and Fisheries Products; and "All Other." For the purposes of the analyses conducted in this report, Durable Goods and "All Other" are collapsed into a single category, "All Other."

The single largest category of goods shipped to and from Southwest Alaska communities as reported in the Waterborne Commerce Statistics is "Other," which includes diverse commodities, such as lumber, dry groceries, fishing gear, machinery, mobile homes, cement, boats, automobiles, toys, office supplies and apparel. All told, "Other" accounts for about 40% of the goods shipped by sea to and from Southwest Alaska communities (Table 6).

Trailing close behind "Other" by volume, is the region's primary economic mainstay and export: fish products. Overall, fish products make up about 35% by volume of products shipped to and from Southwest Alaska by commercial marine carriers. The highest percentage is experienced in Egegik, where 60% of goods carried by marine carriers are fish products. Percentages in King Salmon/Naknek and King Cove are also relatively high.

Petroleum products make up a significant proportion of the freight carried by private marine shippers within Southwest Alaska. Petroleum products, compared to products such as lumber, dry groceries, or heavy machinery, are relatively inexpensive to ship, since they require much less handling and less wasted space than do products that have to be packaged and moved individually. Petroleum products are simply pumped in and pumped out mechanically.

Overall, about 26% of the volume of cargo moved by commercial marine carriers consists of petroleum products. The percentage is particularly high in selected communities, such as Old Harbor, where it reaches fully 83.3%, and to slightly lesser extents in Cold Bay and Chigniks, where the totals are 74.6% and 64.6%, respectively. Unalaska is by far the single largest recipient of petroleum products—ostensibly related to its role as a fueling and transshipment point for marine vessels. Unalaska alone accounts for 447,873 tons of petroleum shipments per year, which represents 70.5% of the regional total of petrol products.

Table 6.
Private Marine Shipments for Southwest Alaska:
Basic Commodity Type Splits
(incoming and outgoing, in tons)

Trip End	Incoming or Outgoing Petrol	Incoming or Outgoing Fish	Incoming or Outgoing Other	TOTAL	PETROL SPLIT	FISH SPLIT	"OTHER" SPLIT
Chignik (or Fisheries or Lagoon)	5,250	375	2,500	8,125	64.6%	4.6%	30.8%
Cold Bay	2,750		935	3,685	74.6%	0.0%	25.4%
Dillingham and Aleknagik	7,000	3,750	11,265	22,015	31.8%	17.0%	51.2%
Egegik	375	1,125	375	1,875	20.0%	60.0%	20.0%
False Pass	125		125	250	50.0%	0.0%	50.0%
Iliamna and Newhalen			976	976		0.0%	100.0%
King Cove	3,375	3,625	4,414	11,414	29.6%	31.8%	38.7%
King Salmon and Naknek	11,000	24,375	24,387	59,762	18.4%	40.8%	40.8%
Kodiak	65,875	105,625	427,903	599,403	11.0%	17.6%	71.4%
Old Harbor	625	125		750	83.3%	16.7%	0.0%
Port Heiden			114	114	0.0%	0.0%	100.0%
Port Lions	625		882	1,507	41.5%	0.0%	58.5%
Sand Point			139	139	0.0%	0.0%	100.0%
St. George			60	60	0.0%	0.0%	100.0%
St. Paul			176	176	0.0%	0.0%	100.0%
Togiak and Togiak Fish			139	139	0.0%	0.0%	100.0%
Unalaska	293,500	383,250	122,930	799,680	36.7%	47.9%	15.4%
Total	**390,500**	**522,250**	**597,320**	**1,510,070**	**25.9%**	**34.6%**	**39.6%**

AMHS Freight Transport

As noted, the percentage of freight carried by AMHS in Southwest Alaska is extremely small. Private carriers simply do not perceive AMHS in its current capacity as a competitor for marine shipment (Terry Hart, Alaska Northbound Marketing Director, personal communications, October 1999).This is likely due to several factors, including the following:

- Current AMHS service to Southwest Alaska communities along the Alaska Peninsula and Aleutian chain is extremely infrequent.
- Compared to private marine shippers, AMHS vessels have very little capacity. For example, while the vessels used in Sea-Land's Alaska service have capacity for about 400 vans, the *Tustumena* can only accommodate in the neighborhood of eight vans.
- Given that they make multiple port calls, AMHS vessels are relatively slow cargo conveyers, compared to private service.
- As a non-competing freight carrier, AMHS is not oriented to providing high-volume, highly efficient logistical capability. For instance, while private carriers often arrange for the delivery of goods from ship or barge to its ultimate destination, AMHS does not offer full service shipping services.
- Most goods shipped to Southwest Alaska originate in Seattle/Tacoma, not Anchorage. Even if they did originate in Anchorage, they would still have to be transported overland to the current ferry terminal at Homer, since AMHS does not currently operate out of Anchorage. Costs accompany each modal transfer. In contrast, private carriers can sail directly to Southwest Alaska from Seattle, or they can proceed to Southwest Alaska following a brief stop in Anchorage to unload goods.

Air Freight Transport

Although air freight makes up less than 2% of all Southwest Alaskan freight movement by volume, it is very important for certain types of goods, such as those with high value and or relatively low weight and volume. Another function served by air freight is to move goods that could be moved by barge more economically—such as building materials—but which, for whatever reason, including poor planning, have to be flown in—either because they are so time-sensitive or because winter ice precludes marine shipment.

Air freight is also critical to those communities, such as Dillingham and Iliamna, which are challenging to reach by water during part of the year. The dependence of communities like Dillingham and Iliamna on air freight is reflected in Table 4. This table indicates that 19% of Dillingham's freight moves by air, and 100% of Iliamna's.[7] Cold Bay, and King Salmon also rely relatively heavily on of air freight. In Cold Bay, 16.23% of freight by volume is handled by air. In King Salmon, the figure is 11.11%.[8]

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[7] The 100% air freight figure for Iliamna is misleading insofar as it does not take into account the barge shipments provided by Coastal Transportation Inc., which serves communities on Lake Iliamna during the brief summertime window when the Kvichak River is high enough to support navigation. This case again reflects the limitations of the US Army Corps of Engineers statistics, which are only collected at relatively major marine ports; the data collection does not extend to cover what happens to the freight once it is broken down to smaller vessels at ports such as Naknek.

[8] Another possibility for these communities' high air freight mode split is that the communities that experience higher rates of air transport also have lower rates of seafood exports—which magnifies the weight of cargo flown out since the mode splits are calculated on a percentage of volume basis.

Three of the four communities that are relatively dependent on air freight have long runways (Cold Bay, Dillingham, and King Salmon). In fact, each of these communities was considered a candidate in an earlier analysis to serve as a regional aviation hub. Clearly, these communities are already to some extent functioning as hubs.

Table 7.
Airport Runway Lengths for SW Alaska Communities Most Dependent on Air Freight

Airport	Runway Length (feet)
Cold Bay	10,420
Dillingham	6,404
Iliamna	5,085
King Salmon	8,500

THE ROLE OF THE MAIL SERVICE IN SOUTHWEST ALASKAN AIR FREIGHT MOVEMENT

The US Postal Service (USPS) plays a bigger role in air freight movement in Bush Alaska than virtually anyplace else in the country. In fact, Crowley Marine cites USPS Bypass Mail as the #1 factor in its suspension of regularly scheduled barge service to Southwest Alaska (Jim Vandeveen, Crowley Marine, personal communications, 11/10/99). The USPS is mandated by law to provide universal mail service throughout the US at uniform rates, regardless of the fact that it is far more expensive to carry out this service in places like Southwest Alaska, where long distances and harsh conditions make air movement of the mail (including freight such as groceries, carried as mail) necessary. Because mail rates must be uniform throughout the country, it costs far less to mail freight by parcel post through the USPS than it would to send goods through a commercial carrier. Tables 8 and 9 provide a comparison of rates for commercial air freight movement, priority mail, and Bypass Mail.[9]

[9] The Bypass Mail Program allows post shipments to bypass a post office, with postage affixed at its origin, thus benefiting from the uniform rate used by the postal service as described below.

Table 8.
Typical Air Freight and Mail Rates
Between Representative City Pairs ($/Pound)

City Pairs	Distance (mi.)	Freight Rate		USPS Priority Mail 2 days			USPS Parcel Post (Bypass) Mail 4-7 Days		
		100lb	100lb-499lb	Up to 1lb	10lb	10lb-70lb (limit)	1lb	10lb	70lb (limit)
Anchorage–Dillingham	329	.70	.50	10.00	1.00	.48	2.31	.31	.08
Anchorage–Iliamna	195	.45	.34	10.00	1.00	.48	2.31	.31	.08
Anchorage–King Salmon	289	.70	.50	10.00	1.00	.48	2.31	.31	.08
Anchorage–Kodiak	252	.70	.49	10.00	1.00	.48	2.31	.31	.08
Anchorage–St. Paul	767	1.07	.97	10.00	1.00	.48	2.31	.31	.08
Dillingham–Anchorage	329	.45	.32	10.00	1.00	.48	2.31	.31	.08
Iliamna–Anchorage	195	.35	.32	10.00	1.00	.48	2.31	.31	.08
King Salmon–Anchorage	289	.45	.32	10.00	1.00	.48	2.31	.31	.08
Kodiak–Anchorage	252	.45	.34	10.00	1.00	.48	2.31	.31	.08
St. Paul–Anchorage	767	.69	.58	10.00	1.00	.48	2.31	.31	.08

Table 9.
Rates Applied to Example of 70-lb. Package

City Pair	Shipping Cost via Commercial Air	Shipping Cost via Priority Mail	Shipping Cost via Parcel Post (Bypass Mail)
Anchorage–Dillingham	$49.00	$33.60	$5.60
Anchorage–Iliamna	$31.50	$33.60	$5.60
Anchorage–King Salmon	$49.00	$33.60	$5.60
Anchorage–Kodiak	$49.00	$33.60	$5.60
Anchorage–St. Paul	$74.90	$33.60	$5.60
Dillingham–Anchorage	$31.50	$33.60	$5.60
Iliamna–Anchorage	$24.50	$33.60	$5.60
King Salmon–Anchorage	$31.50	$33.60	$5.60
Kodiak–Anchorage	$31.50	$33.60	$5.60
St. Paul–Anchorage	$48.30	$33.60	$5.60

An example illustrates the tremendous savings achievable by sending goods via the US Postal Service. Whereas it would cost $49.00 to send a 70-pound package from Anchorage to Dillingham via a private air freight shipper, the same package could be sent for $33.60 via Priority Service, or for a mere $5.60 if sent via Bypass Mail. No wonder one overland shipper in Alaska noted that, "*Everything that can be shipped through the Mail already is*." Another cited the case of an Alaskan who had had most of the materials he used in building his house shipped piecemeal via Bypass Mail.[10] Freight consolidators, whose niche in the logistics market focuses on exploiting the opportunities provided by the USPS, operate in both Anchorage and Seattle.

The subsidization of mail delivery costs provides considerable benefits for the Alaskan residents and for air carriers that operate in the state. Air carriers rely on their mail delivery work as a mainstay of their Alaska service (Neil Fried, State of Alaska Economist, personal communications, September 30, 1999). The carriers' duty to carry mail to remote areas of the state also makes it more economical for them to provide passenger and private freight service. In the absence of the air freight business provided by the federal government to carriers to deliver mail by air, Alaskans would receive less frequent air service—at higher cost.

Under the current system, the USPS allocates mail equally among all carriers offering regularly scheduled service within a similar time frame. "The requirement to maintain competitive service frequency to handle a share of the mail has resulted in more frequent passenger service between Anchorage and Fairbanks and western-arctic hubs, and between hubs and outlying villages than could be supported otherwise" (*Alaska Intermodal Transportation Plan*, Alaska Department of Transportation and Public Facilities, October 1994). Communities in Southwest Alaska that currently serve as hubs include Cold Bay, Port Heiden, Dillingham, Kodiak, King Salmon, and Unalaska/Dutch Harbor.

Between 1987 and 1995, about 11% of total air freight by volume to the Southwest Alaska Study Area comprised mail. Moreover, this percentage is increasing. The costs borne by the USPS to serve Alaska with the Bypass Mail Program have multiplied rapidly (Table 10). Between 1986 and 1991 the intra-Alaska air transportation costs paid by the USPS increased from $59 million to $95 million, most of which went to pay to move parcel post mail. "The increase in costs is due to increased volume, especially to bush destinations, as well as rate increases made under the continuing ratemaking responsibility of the US Department of Transportation to regulate the mail pay rates to air carriers in Alaska.

The deficit resulting from the difference between Alaska parcel post revenue from postage and the cost of purchased air transportation alone has risen from $23 million in 1986 to $70 million in 1991" (*Alaska Parcel Post Task Force Report*. 1993, provided by Carl Siebe, DOT&PF, January 1999). According to this report, the USPS, which was separated from direct Congressional control in 1971, is under pressure to operate more cost-effectively, and to balance user fees, in the form of postage, with delivery methods that allow the USPS to meet the actual costs of providing service. With this goal in mind, the USPS is seeking ways to deliver mail to remote regions of Alaska at a lower cost. Any such efforts will be monitored carefully by Alaska's congressional delegation, insofar as their effects on Alaskans' mobility and access to goods and services will be significant, particularly in the bush. In light of this pressure, one observer

[10] As the result of public outcry over this case, USPS regulations were tightened up to specifically exclude building materials from eligibility for mail shipment (Sam Krogstad, Bush Consolidators, personal communications, October 4, 1999). Other items that cannot be mailed are hazardous materials, as defined by either the USPS or the air carrier.

suggested that the assumption that Alaska will always enjoy low postal rates may not be valid—particularly if and when the state's clout in Congress, now at an all-time high—were to suffer (Neil Fried, personal communications, September 30, 1999.[11]

Table 10.
Alaska Parcel Post
Financial and Operating Summary, 1986-1991

Fiscal Year	Volume (pounds) Mainline	Bush	Revenue	Costs	Loss
1986	90.5	36.4	$8	$31	$23
1987	96.2	38.5	$8	$47	$39
1988	102.3	42.6	$9	$58	$49
1989	108.5	47.0	$11	$62	$51
1990	113.2	49.5	$10	$79	$69
1991	113.7	52.0	$12	$82	$70
% Increase	25.6%	42.9%	50.0%	164.5%	204.4%

Were postal rates paid to move freight as mail to rise to levels that more accurately reflect the actual costs of delivery, then several repercussions would be likely.

- Rural Alaskans, including those who live and work in Southwest Alaska, would have to pay higher rates to mail in consumables, including groceries;
- The price of private freight *and* passenger movement would likely increase, with decreases in service frequency and convenience;
- As the result of the first two repercussions, benefits due to provision of a modal alternative, e.g., the Trans-Peninsula Roadway System, would be much magnified, with a shift from air to roadway transport of mail and other goods assumed.
- Another likely outcome of the loss of the Bypass Mail subsidy could be population movements from rural village to hub communities where economies of scale would be easier to realize.

[11] Congress could end the bypass mail system, which would adversely affect the convenience of using parcel post and add to the total cost of moving goods (though not the postage rates themselves). Congress could also require that all postage rates reflect the cost of provision, but that would affect communities in every state and would probably not be politically feasible regardless of Alaska.

PART 2. FREIGHT MOVEMENT DEMAND FORECASTS

Described in this section is the methodology developed to forecast freight transport demand for the Southwest Alaska Study Area. Forecasts were developed for Petroleum Products, Fish Products, and "Other" Products, including Mail.

FREIGHT FORECASTS FOR PETROLEUM PRODUCTS

To forecast petroleum freight moved, several variables were tested statistically to determine which of them produced the best "fit" in predicting freight volumes. The best and final model includes population, and a variable to indicates the type of airport and marine facilities at the community (either only a community services port, a commercial services port or airport HUB, or both a commercial services port and an airport HUB). For the purpose of the forecast it is assumed that the types of marine or airport facilities at a community will be the same in the year 2010 and 2020. This model is as follows:

$$\text{Tons of Petroleum Shipped} = (2.443375)(\text{Population}) + (27778.04)(\text{Port Types})$$

The "goodness of fit" or R^2 coefficient for this model was poor, about 0.286, indicating that only about 29% of the variation in petroleum shipped can be explained by population and marine and airport types. This model is based on a limited data set of only 11 records. Only a limited data set is available because confidentiality requirements. To help improve the accuracy of the model, forecast volumes were adjusted.[12]

Petroleum shipments are forecast to stay about the same at most communities in the study area. Petroleum shipments, however, are forecast to decrease at Cold Bay for the low, base, and high 2010 and 2020 scenarios. Shipments are also forecast to decrease slightly at several other communities in the low and base 2010 scenarios, and in the low 2020 scenario. These forecast decreases in petroleum movement are related to projected population decreases in the corresponding communities. The complete results of this analysis can be found in "Southwest Alaska Transportation Plan Travel Demand Forecasts," (September 1998).

FREIGHT FORECASTS FOR "OTHER" CARGO, INCLUDING MAIL

To forecast freight movement for "Other" cargo, including mail, several variables were tested statistically. The model that proved most effective in mathematically replicating existing freight movement relied on a single variable: population. This model is as follows:

$$\text{Tons of Other Cargo Shipped} = (36.21088203)(\text{Population})$$

At 0.95, the "goodness of fit" measure for this model, otherwise known as the R^2 coefficient, was quite high. This indicates that about 95% of the variation in "Other" cargo shipped can be

[12] Forecast volumes were adjusted by comparing initial modeling output to known, existing volumes. That is, volumes "forecast' by the model for the existing year, based on current conditions, were compared to the actual volume reported. The ratio between existing year volumes "forecast" and the actual volume reported was then applied to future forecasts.

predicted on the basis of population. However, this model is based on a limited data set of only 16 records. Therefore, it improve its accuracy, forecast trips were adjusted.[13]

Other cargo shipped are forecast to increase at most communities in the study area. However, shipments are forecast to decrease at Cold Bay for the low, base, and high 2010 and 2020 scenarios. This decrease corresponds to the forecast for a decreasing population in Cold Bay through the year 2020. In the low and base 2010 scenarios, shipments are also forecast to decrease at Chignik. Shipments are also forecast to decrease at several other communities for the low scenario only for 2010 and 2020.

FREIGHT FORECASTS FOR REMAINING SOUTHWEST ALASKA COMMUNITIES

A limitation of the freight forecasts at the level just described is that they only project freight volumes for a relatively small number of study area communities—the communities for which primary source data are available. However, only about 40% of Southwest Alaska's residents live in these communities. To fill in this gap in the forecasts, another analytical step was taken. To provide community-specific freight movement forecasts for the 60% of study area communities where primary data are not available, freight movement values were imputed.

A straightforward process was used to impute freight movement values to study area communities. First, the region's 2020 freight movement forecasts (base case) were totaled and then divided by the 2020 base population forecast for the region as a whole. Separate calculations were applied to Petroleum Products and "All Other." Note that Fish and Fisheries Products movements were not allocated among the study area communities.[14]

Note too, that Unalaska, which experiences by far the region's highest freight per capita, was excluded from this averaging process. This is because the vast majority of Unalaska's freight movement is attributable to two of its unique roles in the region: (1) its role as a major fish processing location; and (2) its role as a transshipment point for international freight lines bound for Asia. Had Unalaska not been excluded from the equation, then the resulting per capita freight movement estimate would have been grossly inflated. It would not have been as good an approximation of freight moved through the rest of the region's communities, which do not serve as major fish processors or transshipment nodes. For similar reasons, Kodiak's freight movement and population were excluded from the average. In essence, the goal of this exercise was not to develop the most accurate average, in terms of per capita freight movement in the region, but rather, to develop a reasonable proxy measure with which to predict consumption-based cargo flows to specific communities. The exclusion of Unalaska and Kodiak from the regional average helped meet this objective.

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[13] Forecast volumes were adjusted by comparing initial modeling output to known, existing volumes. That is, volumes "forecast' by the model for the existing year, based on current conditions, were compared to the actual volume reported. The ratio between existing year volumes "forecast" and the actual volume reported was then applied to future forecasts.

[14] The reasoning for not imputing fish value is as follows. Fish and Fisheries products are overwhelmingly *exported out* of Southwest Alaska, and the largest producers appear to be represented in the primary source data that are available. It is reasonable to impute freight values for Petroleum Products and "All Other" because consumption of food, fuel, and clothing, all of which must be imported to the region, can safely be assumed. However, any assumption that every community in the region exports fish products or serves as a transshipment point would be far more tenuous, and in some cases, would run contrary to what is known about regional freight movement.

This averaging process produced a value of 2.7 tons per person for petroleum products, and 4.05 tons per person for “Other” cargo. These values were multiplied by the 2020 base case population forecasts for each study area community. The result was an “imputed” 2020 freight movement forecast total for each community. The results of this process for affected study area communities are compiled in Table 11.

Once the volume of freight movement, roughly categorized by type, had been established for each affected study area community, it finally became possible to “cost out” the price of moving the forecast volumes under selected scenarios. The process used to establish approximate rates currently paid to move freight to Southwest Alaska, along with estimated rates under different circumstances than currently exist; i.e., under the alternatives proposed as part of this regional transportation planning effort—is described in the following section.

Table 11.
2020 Freight Movement by Southwest Alaska Community

	2020 Population Forecast	2020 Petrol Forecast (tons)	2020 "Other" Forecast (tons)	Total (tons)
Chigniks	377	1,018	1,527	2,545
Dillingham and Aleknagik	2,943	7,946	11,919	19,865
Egegik	167	451	676	1,127
Igiugig	68	184	275	459
Iliamna and Newhalen	346	934	1,401	2,336
Ivanof Bay	27	73	109	182
King Salmon and Naknek	1,372	3,704	5,557	9,261
Nondalton	317	856	1,284	2,140
Pedro Bay	45	122	182	304
Perryville	116	313	470	783
Pilot Point	115	311	466	776
Port Heiden	158	427	640	1,067
South Naknek	165	446	668	1,114
TOTALS	**6,562**	**17,717**	**26,576**	**44,294**

PART 3. FREIGHT MOVEMENT ASSESSMENT METHODOLOGY

ESTIMATING FREIGHT RATES UNDER EXISTING CONDITIONS

Having established a means of predicting freight movement volumes for each study area community, the next step in the analysis was to develop a framework with which to understand two facets of regional freight movement: (1) how much it would cost to move predicted volumes under an unchanged regional transportation network; and (2) how much it would cost to move predicted volumes if specified improvements in the regional transportation network were implemented. The improvements of interest are implementation of the Trans-Peninsula Roadway System in its entirety, as well as implementation of one element of that system, rehabilitation of the Williamsport to Pile Bay Road. Separate modal rates for the movement of "household goods" for each affected study area were eventually established, under both existing conditions and the proposed alternatives.

Rate establishment was one of the most challenging tasks in developing this freight movement assessment methodology. There is no single, convenient source of shipping rates, which in any case vary by mode. Different shippers serve different communities within the study area. Many shippers insist on keeping their actual rates confidential since much freight movement in Southwest Alaska is negotiated on a contract basis among competitors. Other shippers are reluctant to reveal their contract rates for fear that their publication will result in accusations of price gouging.

Aside from these complications, establishment of a single set of rates for analytical purposes was also complicated by the very nature of the multiple industries that transport goods. The rate that is ultimately paid to move goods from one point to another depends on complex interactions among many variables, including those listed below. Shipping rates among goods, among modes, and among times of the year—can and do vary tremendously.

- **Mode**. It is generally more expensive to ship goods by air than by sea. For bulk commodities, it is often less expensive to ship goods by sea than by land.
- **Handling**. The amount of handling required. It is relatively inexpensive to move petroleum products, for example, because they can be pumped directly in an out of dedicated storage facilities. They do not have to be assembled, wrapped, unloaded by hand, etc.
- **Special handling requirements**. Goods that require refrigeration or freezing are more expensive to haul than those that do not require this special treatment. Hazardous materials command a premium. In some cases, certain modes are precluded from even carrying the goods.
- **Spatial dimensions**. The dimensions of goods and or their packaging have a bearing on shipping costs. Bulky goods that take up a lot of space are more expensive, per pound, to ship than those that are more compact.
- **Backhaul**. The opportunity for backhaul is a factor. When a shipper can bring a load of goods to a point, and then fill up the vehicle, vessel, or aircraft with goods for the return journey, costs are much lower than if the shipper were to return to home base with an empty container.

- **Port facilities**. Characteristics of marine ports have a bearing on marine shipping costs. Ports with shallow water, such as Ivanof Bay, are more expensive to serve than deep-water ports, such as Chignik.
- **Volume**. Related to the backhaul factor is volume. All other things equal, rates will generally decrease with increased volume on a per trip basis. In addition, frequent shippers will generally enjoy lower rates than infrequent shippers.
- **Distance** between ports is a factor, insofar as longer distances entail higher fuel and labor costs.
- **Season**. This factor has to do with the region's extreme and challenging weather. It is much more expensive to move goods during the winter than during the summer. This is because some ports are not accessible by any mode other than air during the winter. Whereas communities around Lake Iliamna can be reached by moving barges up the river when the river water is high enough, and when it is not frozen (roughly three months per year), the rest of the year, goods, including petroleum products, must be flown in.
- **Natural navigational features.** Freight movement rates are affected by natural limitations to the size and efficiency of vessel that can be used to transport goods. The size of vessel that can currently be used to supply the communities of Iliamna Lake via the Kvichak River, for instance, is limited by the river. Only small barges, in the neighborhood of 150' by 45' are used in this area.
- **Competition** between shippers is a factor. Where two or more shippers compete to haul the same cargo, prices would ostensibly be lower than if one shipper held a monopoly.
- **Government regulation and subsidies**, such as the US Postal Service's Bypass Mail program, which has already been described.

Current and forecast rates were developed separately for Petroleum and "All Other" products.[15] Ultimately, distinction of petroleum from "all other" cargo is only possible because the US Army Corps of Engineers separates out petroleum in its Waterborne Commerce Statistics. As desirable as it would have been to provide this level of specification of "Other" commodities, the underlying data upon which the analyses in this report are based do not support that level of detail.

Because there is no way to know what is being shipped by air (absent a major new commodity flow study for the study area), and because even the available primary source data are not available for points beyond the region's cargo hubs, a proxy had to be used to represent freight flows. Based on input from shippers, "household goods" were used as a proxy for "Other" freight.

The consultant team is grateful to the many individuals and organizations who provided input and information for the rate establishment task. The data gathering for this task included multiple interviews with overland, marine, and air shippers in the region. The following organizations and individuals provided input into the rate estimation and forecasting process:

[15] It is much less expensive, on a unit basis, to move petroleum than most other commodities because petroleum, a pumped product, requires so little labor and handling.

Alaska Airlines	FS Air Services
Bush Consolidators	Harkness Enterprises
Carlile Transportation	Iliamna Transportation Company
Neal Fried (Economist, State of Alaska)	Dennis Niedermeyer (Lake and Peninsula School District)
Coastal Freight and Salvage	Northland Services
Coastal Marine Services	PenAir
Crowley Marine	Reeve Aleutian Airlines
Crowley Petroleum	Samson Tug and Barge
ERA Air Cargo	Sea-Land
Everts Air Fuel	Orson Smith, Ph.D., University of Alaska
CAT Transportation	

Listed in Table 12 and Table 13 are separate rate estimates for petroleum and "Other" cargo movement under existing conditions. Communities in the Iliamna Lake area are presented separately.[16] Rate estimates were developed only for those communities that would be linked by the new roadway connections that are proposed as part of this regional transportation plan. Ultimately, existing shipping rates will be compared to projected rates under the assumption of a changed infrastructure. This comparison will allow us to assess the economic impacts of the Trans-Peninsula Roadway; as they relate to freight movement in particular. This analysis and comparison will call upon the freight movement forecasts described earlier in this report. Rates under the existing infrastructure and projected rates under the improved infrastructure will be multiplied against forecast freight volumes to derive overall cost savings. In evaluating the alternatives, these costs or benefits will be weighed against the capital and maintenance and operations costs associated with the proposed alternative. This comparison will be documented in the course of carrying out the evaluation process.

16 The Iliamna Lake communities are accessible via either Bristol Bay or Cook Inlet; shipping rates for each point of access are distinct. As such, separating the Iliamna Lake communities from the others makes it easier to understand to the rate tables.

Table 12.
Existing Freight Rates for Selected Southwest Alaska Communities

	MARINE			AIR				
	Petroleum Marine ($/gal)	Petroleum Pound Price Equiv ($/lb)	Other Marine ($/lb)	Petroleum Air ($/gal)	ANC-DIL	ANC-KS ($/lb)	KS- ($/lb)	AIR TOT ($/lb)
Chignik	$0.250	$0.038	$0.250	NA		$0.420	$0.560	$0.980
Chignik Lake	$0.500	$0.076	$0.500	NA		$0.420	$0.560	$0.980
Chignik Lagoon	$0.600	$0.091	$0.600	NA		$0.420	$0.560	$0.980
Dillingham/Aleknagik	$0.300	$0.046	$0.510	NA	$0.420			$0.420
Egegik	$0.500	$0.076	$0.510	NA		$0.420	$0.250	$0.670
Ivanof Bay	$0.270	$0.041	$0.700	NA		$0.420	$0.670	$1.090
King Salmon/Naknek	$0.300	$0.046	$0.510	NA		$0.420	$0.000	$0.420
Perryville	$0.300	$0.046	$0.600	NA		$0.420	$0.650	$1.070
Pilot Point	$0.520	$0.079	$0.540	NA		$0.420	$0.360	$0.780
Port Heiden	$0.350	$0.053	$0.510	NA		$0.420	$0.450	$0.870

*Air rates in this table are based on a 500-pound shipment. Note that marine rates to Chignik are relatively low, compared to Chignik Lake and Chignik Lagoon. Chignik has a year round, ice-free port, which makes its access relatively easy (and inexpensive). In contrast, a premium must be paid by the residents of Chignik Lake and Chignik Lagoon to import freight from Chignik. It is also notable that although Naknek is much farther from cargo destination points than Chignik, it is not much more expensive to get goods to Naknek than to Chignik. This is in part a function of the volumes carried. Goods transported to Naknek are also transported to the relatively large market of Bristol Bay communities, including Dillingham.

Table 13.
Existing Freight Rates for Iliamna Lake Communities

	MARINE						AIR				
	From Naknek			From Williamsport							
	Petroleum Marine	Petroleum Pound Price Equiv	Other Marine	Petroleum Marine	Petroleum Pound Price Equiv	Other Marine	Petroleum Air	Petroleum Pound Price Equiv	ANC-ILI	ILI-	AIR TOT
	($/gal)	($/lb)	($/lb)	($/gal)	($/lb)	($/lb)	($/gal)	($/lb)			
Igiugig	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.250	$0.640
Iliamna/ Newhalen/ Nondalton	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.000	$0.390
Levelock	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.250	$0.640
Pedro Bay	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.200	$0.590

Marine shipping rates for petroleum via Williamsport are not provided because petroleum is not currently shipped via Cook Inlet, primarily because of the difficulty of meeting hazardous materials regulations (Rick Harkness, Harkness Enterprises, personal communications, November 1999).

Freight Movement to Iliamna Lake Communities

It bears mentioning that waterborne freight reaches the communities of Iliamna Lake via two routes. The primary route, which accounts for some 80% of Iliamna Lake communities' waterborne cargo, is via Naknek, where barges originating in the Seattle-Tacoma area offload onto much smaller barges that navigate the Kvichak River during its brief season of navigability. This season, during which the river is both ice-free and high enough to support even shallow-draft vessels, generally runs from early August to late November (Rick Harkness, personal communications, November 1999). The rate charged to lighter the goods from Naknek to Iliamna Lake communities is approximately 50% over and above the cost of getting the goods from Seattle to Naknek (Coastal Marine). Via Naknek, petroleum shipment runs $0.80 per gallon, while "Other" cargo runs about $0.77 per pound.

Although reliance on air shipment in the region is atypically high, this route is very important to Iliamna Lake communities because it is the only way to bring in particularly heavy and or bulky equipment, which can neither be flown in nor barged-trucked via Williamsport because of that route's width, height and weight limitations. The fact that heavy equipment can only be transported for a brief period of the year (and some years not at all, if the river remains low) is thought to have expensive repercussions for area construction costs. The reason for this is that contractors realize that they may have to keep an expensive capital asset, a piece of heavy machinery—in the area for months in which it is not in use. For this reason, it is thought that contractors add a substantial margin to their bids on construction projects to cover their costs and asset depreciation.

The other marine route to Iliamna is via Williamsport, which accounts for some 20% by volume of the cargo surface shipped to Iliamna Lake communities (Rick Harkness, Harkness Enterprises, personal communications, November 1999). Despite Williamsport's navigational challenges (it is shallow, muddy and strewn with boulders), barges operated by Coastal Freight and Salvage call on this port from Homer from June until November. The limiting seasonal factors are both ice on the lake, and the road's passability due to snow. Upon arrival at Williamsport, barges are offloaded onto a truck operated by the Iliamna Transportation Company—which has been in existence since 1938. Upon completion of the road trip, at Pile Bay, cargo may be distributed to its ultimate destination in two ways:

- Some consumers sail their own vessels to Pile Bay to pick up shipments.
- A licensed operator on Iliamna Lake picks up the shipments and distributes them among the Iliamna Lake communities in his vessels.

According to area operators, the rate breakdown is approximately as follows:

Homer to Williamsport (barge)	$0.12/lb
Williamsport to Pile Bay (truck)	$0.10/lb
Pile Bay to Ultimate Destination (barge)	$0.15/lb
TOTAL	**$0.37/lb**

This rate is considerably lower than the $0.77 per pound rate estimated for shipment via Naknek. However, route is arduous, for several reasons, including Williamsport's shortcomings as a port. Shallow water restricts barge deliveries to about two tides per month, each of which lasts about five days (Otto Kilcher, Coastal Freight and Salvage, personal communications, November 1999). Once transferred to the truck, there are other obstacles, including the washed out bridge on the road at Chinkelyes Creek, which requires that the truck ford the stream. This is hard on vehicle transmission and bearings, and on some cargo in particular, such as sheetrock and cement. Moreover, it poses safety hazards for operators (Ray Williams, Iliamna Transportation Company, personal communications, November 1999).

ESTIMATING RATES UNDER THE PROPOSED SCENARIOS

Having established freight shipment rates under existing conditions, the next analytical task was to project freight shipment rates under two separate scenarios related to alternatives proposed as part of this regional transportation planning effort. As noted earlier, two scenarios were explored: (1) Under **Scenario 1**, it is assumed that under all proposed roadway links, along with ferry service between the Kenai Peninsula and the Alaska Peninsula are implemented. Under **Scenario 2**, it is assumed that only select elements of the Cook Inlet to Bristol Bay Corridor are implemented: namely, the navigational improvements at Williamsport and rehabilitation of the existing road and bridges between Williamsport and Pile Bay. While projecting rates for the Williamsport to Pile Bay Road was relatively simple, insofar as it had been studied previously (US Army Corps of Engineers, 1995), projecting rates for the larger project, the Trans-Peninsula Road was more complex.

This task required interface with area shippers, most of whom were reluctant to speculate on what they perceived as an extremely remote possibility. Most of those contacted expressed skepticism that the populations and volumes of freight to be served would justify the projects' large capital and maintenance costs. Ultimately, however, they were persuaded that their educated guesses as to the freight cost impacts of the proposed alternatives would be superior to those of anyone without firsthand experience with study area shipping.

Modal rate estimates for affected study area communities were developed by breaking the journey from cargo origin to destination into its constituent modal links or elements. Unit costs were used where possible. Three sets of rates were developed:

- Petroleum Rates under Scenario 1;
- "Other" Cargo Rates under Scenario 1;
- "Other" Cargo Rates under Scenario 2.[17]

Scenario 1. Estimated Petroleum Movement Rates

To project what it would cost to transport petroleum products to selected study area communities if the Scenario 1 were implemented, estimates for the barge portion of the trip, as well as the trucking portion of the trip, were elicited from Crowley Petroleum and from several trucking companies now operating in Alaska.

[17] For reasons to be discussed, implementation of Scenario 2 is not anticipated to have significant economic impacts on the shipment of petroleum products.

While multiple marine shippers have long served study area communities, regional-scale trucking operations on the Alaska Peninsula are nonexistent because the study area has so little roadway infrastructure. Several firms that operate on the Alaska roadway network were therefore contacted.

Upon discussions with shippers, it was determined that a logical delivery pattern for petroleum products, under the assumption that the Trans-Peninsula Roadway is built, would be for a barge to make separate stops in both Williamsport and in Chignik. This is due to the fact that the trucking portion of the trip could be accomplished less expensively by choosing a closer port.

Per gallon barge costs were estimated at 12 cents per gallon from Anchorage to Chignik, and at 10 cents per gallon from Anchorage to Williamsport. Trucking costs were estimated at $6.75 per mile. Trucking cost estimates were developed on the basis of input by Carlile and CAT, trucking firms that now operate in Alaska, but outside of the study area. Both firms were quick to point out the speculative nature of their estimates. They pointed out that rates would be sensitive to volume, start-up costs (regarding which there is considerable uncertainty), and unusual maintenance and operations costs attributable to Southwest Alaska's remote and challenging natural environment. In providing their estimates, the trucking companies assumed that the road would be paved, maintained, and designed to AASHTO standards. For the purposes of this analysis, a tanker truck with a 7,500 gallon capacity was assumed.

Mileage between each affected community and the ports of Chignik and Williamsport was calculated based on specifications provided in an earlier deliverable, "Southwest Alaska Description of Alternatives Technical Memorandum." Total petroleum shipment rates for each affected study area community represent the sum of the barge and trucking related costs. Tables 14, 15 and 16 contain the resulting rate estimates. Table 14 calculates rates under the assumption that Williamsport serves as the intermodal transfer point. Table 15 calculates rates assuming that Chignik serves as the intermodal transfer point. Finally, Table 16 lists the lowest rate for each community, based on marine port of call.

Table 14.
Scenario 1. Cost Analysis for Petroleum Movement
(Williamsport as Transfer Point)

	Existing Conditions	Estimated Rates Assuming that the Trans-Peninsula Roadway is Built				
	Current Price	Price per gal ANC to Williamsport	Road Distance from Williamsport	Trucking Price Total at $6.75/mi	Trucking Price per gal at 7,500 gal/load	Total Price (barge+road)
	($/gal)	($/gal)	(mi)	($)	($/gal)	($/gal)
Chignik	$0.250	$0.10	466	$3,146	$0.419	$0.519
Chignik Lagoon	$0.500	$0.10	462	$3,119	$0.416	$0.516
Chignik Lake	$0.600	$0.10	450	$3,038	$0.405	$0.505
Dillingham/Aleknagik	$0.300	$0.10	224	$1,512	$0.202	$0.302
Egegik	$0.500	$0.10	262	$1,769	$0.236	$0.336
Igiugig	$0.800	$0.10	109	$736	$0.098	$0.198
Iliamna/Newhalen/ Nondalton	$0.800	$0.10	53	$358	$0.048	$0.148
Ivanof Bay	$0.270	$0.10	516	$3,483	$0.464	$0.564
King Salmon/Naknek	$0.300	$0.10	184	$1,242	$0.166	$0.266
Levelock	$0.800	$0.10	148	$999	$0.133	$0.233
Pedro Bay	$0.800	$0.10	26	$176	$0.023	$0.123
Perryville	$0.300	$0.10	506	$3,416	$0.455	$0.555
Pilot Point	$0.520	$0.10	317	$2,139	$0.285	$0.385
Port Heiden	$0.350	$0.10	404	$2,727	0.364	$0.464

Table 15.
Scenario 1. Cost Analysis for Petroleum Movement
(Chignik as Transfer Point)

Anchorage to	Current Price ($/gal)	Price per gal ANC to CHIGNIK ($/gal)	Road Distance from Chignik (mi)	Trucking Price Total at $6.75/mi ($)	Trucking Price per gal ($/gal)	Total Price (barge+road) ($/gal)
Chignik	$0.250	$0.12	0	$0	$0.000	$0.120
Chignik Lagoon	$0.500	$0.12	12	$81	$0.011	$0.131
Chignik Lake	$0.600	$0.12	16	$108	$0.014	$0.134
Egegik	$0.500	$0.12	204	$1,377	$0.184	$0.304
Dillingham/Aleknagik	$0.300	$0.12	385	$2,599	$0.347	$0.467
Igiugig	$0.800	$0.12	357	$2,410	$0.321	$0.441
Iliamna/Newhalen/ Nondalton	$0.800	$0.12	413	$2,788	$0.372	$0.492
Ivanof Bay	$0.270	$0.12	50	$338	$0.045	$0.165
King Salmon/Naknek	$0.300	$0.12	269	$1,816	$0.242	$0.362
Levelock	$0.800	$0.12	318	$2,147	$0.2862	$0.406
Pedro Bay	$0.800	$0.12	440	$2,970	$0.396	$0.516
Perryville	$0.300	$0.12	40	$270	$0.036	$0.156
Pilot Point	$0.520	$0.12	149	$1,006	$0.134	$0.254
Port Heiden	$0.350	$0.12	62	$419	$0.056	$0.176

Table 16.
Scenario 1. Least Cost Petroleum Rates

	Current Price ($/gal)	Assumes Community Served from	Total Price (barge+road) ($/gal)
Chignik	$0.25	Chignik	$0.12
Chignik Lagoon	$0.50	Chignik	$0.13
Dillingham/Aleknagik	$0.30	Williamsport	$0.30
Chignik Lake	$0.60	Chignik	$0.13
Egegik	$0.50	Chignik	$0.30
Igiugig	$0.80	Williamsport	$0.20
Iliamna/Newhalen/Nondalton	$0.80	Williamsport	$0.15
Ivanof Bay	$0.27	Chignik	$0.17
King Salmon/Naknek	$0.30	Williamsport	$0.27
Levelock	$0.80	Williamsport	$0.23
Pedro Bay	$0.80	Williamsport	$0.12
Perryville	$0.30	Chignik	$0.17
Pilot Point	$0.52	Chignik	$0.25
Port Heiden	$0.35	Chignik	$0.18

Scenario 2. Estimated Petroleum Movement Rates

Although, as will be seen in subsequent analysis, it is clear that implementing Scenario 1 would produce significant petroleum movement cost savings, it is not obvious that implementing Scenario 2 would have a similar effect. Part of the reason for this is that fuel is transported relatively cheaply by plane. According to Everts Air Fuel, petroleum can profitably be flown in at a rate of about $0.96 per gallon (personal communications, November 1999). This rate is comparable to the $0.80 per gallon rate that it costs to move petroleum up the Kvichak River from Naknek.

Also detracting from potential cost savings is the fact that two transfers would be required if only the Williamsport to Pile Bay segment of the Trans-Peninsula Roadway were improved. The first transfer would be from Cook Inlet barge to truck; the second would be from truck back to Iliamna Lake vessel. Because of the labor and coordination they require, transfers are costly.

For these reasons, petroleum shipping rates under the assumption of rehabilitating the Williamsport to Pile Bay Road as a stand-alone element were not developed.

Scenario 1. Estimated "Other" Cargo Movement Rates

Although rates to move "Other" cargo were projected in much the same way as were petroleum rates, there were a couple of differences in the methodology. First, whereas Alaska has multiple oil refineries, from which point products can be shipped directly to Southwest Alaska, most "Other" cargo originates in the lower 48, specifically, in the ports of Seattle and Tacoma. As such, the cost projections for the barge portion of the transport of "Other" cargo originate in Seattle rather than Anchorage. This assumption is based on shippers' input indicating that very

little of what is shipped to Southwest Alaska originates within the state--for two main reasons. First, manufacturing and agricultural production in Alaska are very limited. Second, Alaska cities' ability to serve as transshipment points is limited by a lack of warehousing and storage facilities (Terry Hart, Sea-Land, Alaska Northbound Marketing Manager, personal communications, October 1999).

Another difference is in the type of truck used to transport the goods along the road. Whereas a 7,500-gallon tanker truck was assumed to be used to deliver petroleum products, a 35-foot van is assumed to deliver "Other" cargo. A 35-foot van can carry about 22,750 pounds of cargo.[18] The same $6.75 per mile rate is assumed for both petroleum and "Other" cargo transport.

As was done for petroleum rate projections, the barge portion of the transport costs for "Other" cargo was simply added to the truck-related costs for a single per-pound total. Again, rates are calculated using both Williamsport and Chignik as the transfer point from marine vessel to truck (Table 17 and Table 18). Meanwhile, Table 19 compiles the lowest rate for each community based on which port of call is used for the intermodal transfer.

[18] To estimate the freight-carrying capacity of a van of a given length, the assumed number of feet (35') was multiplied by 650 for total pounds. This 650-pound figure is based on the suggested equivalency found in *Transportation Research Board, Special Report 223-Providing Access for Large Trucks*, 1989, p. 177.

Table 17.
Scenario 1. Cost Analysis for "Other" Cargo
(Williamsport as Transfer Point)

Seattle to	Barge Cost ($/lb)	Road Distance from Wmsport (mi)	Trucking Cost at $6.75/mi ($)	Total Trucking Cost ($/lb)	Total Cost ($/lb)
Chignik	$0.27	466	$3,146	$0.114	$0.384
Chignik Lagoon	$0.27	462	$3,119	$0.113	$0.383
Chignik Lake	$0.27	450	$3,038	$0.110	$0.380
Dillingham/Aleknagik	$0.27	224	$1,512	$0.055	$0.325
Egegik	$0.27	262	$1,769	$0.064	$0.334
Igiugig	$0.27	109	$736	$0.027	$0.297
Iliamna/Newhalen/Nondalton	$0.27	53	$358	$0.013	$0.283
Ivanof Bay	$0.27	516	$3,483	$0.127	$0.397
King Salmon/Naknek	$0.27	184	$1,242	$0.045	$0.315
Levelock	$0.27	148	$999	$0.036	$0.306
Pedro Bay	$0.27	26	$176	$0.006	$0.276
Perryville	$0.27	506	$3,416	$0.125	$0.394
Pilot Point	$0.27	317	$2,140	$0.094	$0.364
Port Heiden	$0.27	404	$2,727	$0.099	$0.369

Table 18.
Scenario 1. Cost Analysis for "Other" Cargo
(Chignik as Transfer Point)

Seattle	Price per # Sea to Chignik	Road Distance from Chignik (mi)	Trucking Price Total at $6.75/mi	Trucking Price per Pound	Total Price (barge+road)
Chignik	$0.22	0	$0	$0.000	$0.220
Chignik Lagoon	$0.22	12	$81	$0.003	$0.223
Chignik Lake	$0.22	16	$108	$0.004	$0.224
Dillingham/Aleknagik	$0.22	385	$2,599	$0.095	$0.315
Egegik	$0.22	204	$1,377	$0.050	$0.270
Igiugig	$0.22	357	$2,410	$0.089	$0.308
Iliamna/Newhalen/Nondalton	$0.22	413	$2,788	$0.101	$0.321
Ivanof Bay	$0.22	50	$338	$0.012	$0.232
King Salmon/Naknek	$0.22	269	$1,816	$0.066	$0.286
Levelock	$0.22	318	$2,147	$0.078	$0.298
Pedro Bay	$0.22	440	$2,970	$0.108	$0.328
Perryville	$0.22	40	$270	$0.010	$0.230
Pilot Point	$0.22	149	$1,006	$0.037	$0.257
Port Heiden	$0.22	62	$419	$0.015	$0.235

Table 19.
Scenario 1
Least Cost "Other" Rates

Seattle to	Current Price ($/lb)	Assumes Community Served from	Total Price (barge + road) ($/lb)
Chignik	$0.250	Chignik	$0.220
Chignik Lagoon	$0.600	Chignik	$0.224
Chignik Lake	$0.500	Chignik	$0.225
Dillingham/Aleknagik	$0.510	Williamsport	$0.325
Egegik	$0.510	Chignik	$0.280
Igiugig	$0.765	Williamsport	$0.302
Iliamna/Newhalen/Nondalton	$0.765	Williamsport	$0.286
Ivanof Bay	$0.700	Chignik	$0.235
King Salmon/Naknek	$0.510	Chignik	$0.300
Levelock	$0.765	Chignik	$0.298
Pedro Bay	$0.765	Williamsport	$0.278
Perryville	$0.600	Williamsport	$0.339
Pilot Point	$0.540	Chignik	$0.257
Port Heiden	$0.510	Chignik	$0.238

Scenario 2. Estimated "Other" Cargo Movement Rates

Rehabilitation of the existing Williamsport to Pile Bay Road has important freight movement implications in its own right, whether or not any other links are built. The existing Williamsport to Pile Bay road is a 15.5-mile gravel road with no shoulder. Historically, the road has been used to transport fishing vessels of the Bristol Bay gillnet fleet between Cook Inlet and Bristol Bay, which allows a safer, faster route than sailing around the Alaska Peninsula. However, the road and its bridges are in extremely poor repair. The project contemplated as part of this regional transportation plan would reconstruct and widen the existing road in accord with national design standards.[19] Also included as part of this project element would be navigational improvements at Williamsport, including dredging the approach channel, as recommended by the US Army Corps of Engineers in its 1995 study. If this scenario were implemented, it would become possible to barge goods to Williamsport, truck them to Pile Bay, and then barge them to communities lying along the shores of Iliamna Lake. Goods could be moved down the Kvichak River to Bristol Bay between early August and late October, when the river is ice-free and when its water level is high enough to support navigation. The lake itself is navigable for six months a year, between May and October. As such, a marine shipper would need to dedicate a barge to serve Iliamna Lake communities during the six months the lake is navigable.[20]

To estimate freight movement cost savings that could be achieved by dredging the channel at Williamsport, along the existing road and its bridges, the elements of current freight delivery to the region were considered. Operators of each of the modal links that is now required to move goods from Homer to the communities of Iliamna Lake via Williamsport were interviewed. Their estimates of the per pound cost for each modal link of this journey are noted below. Current total costs, (i.e., under existing conditions) are estimated at $0.37 per pound. These shippers had a difficult time predicting the impact of channel dredging and road reconstruction. They put the savings achievable by making these improvements in the neighborhood of 20%, as did shippers who now operate out of Naknek. However, the US Army Corps of Engineers (USCOE), in its 1995 study, estimated a much larger shipping cost savings under this scenario—in the neighborhood of 56%. In attempt to reconcile this difference, the approach taken in this assessment is more conservative than the USCOE's, but more optimistic than the shippers': A cost savings rate of 35% was applied to the existing rate:

Homer to Williamsport (barge)	$0.12/lb
Williamsport to Pile Bay (truck)	$0.10/lb
Pile Bay to Ultimate Destination (barge)	$0.15/lb
Existing Conditions Total	$0.37/lb
Estimated Cost Savings with Project:	
$0.37 - ($0.37 * 0.35) = $0.24	$0.24/lb

[19] The project would rebuild the existing road to meet standards set forth for a rural major collector with an ADT of less than 250 vehicles per day, as specified by the American Association of State Highway and Transportation Officials (AASHTO).

[20] Another reason to explore the freight movement impacts of this project as a stand-alone element has to do with the fact that of all the roadway links contemplated, this one faces fewer environmental and political obstacles than do the others. The Williamsport to Pile Bay segment may face fewer implementation obstacles because a roadway—albeit in poor repair and primitive—already exists. The project proposed as part of this transportation plan would renovate this road, paving it, widening it, and bringing it up to national standards. As such, the political and environmental issues surrounding most roadway projects in Alaska would not be as formidable as building a new stretch of infrastructure through undeveloped wilderness.

As pointed out by the USCOE and the shippers themselves, freight movement savings can be anticipated stemming from several sources:

- Reduced damage and wear and tear to transport vessels and vehicles, which should reduce shippers' capital and maintenance and operations costs;
- Reduced operating (and possibly capital) costs due to the elimination of the tide-related barge delays that are now frequently experienced;
- Removing the obstacles to freight shipment along this corridor would likely increase volumes of goods shipped, reducing unit costs;
- Insofar as volumes shipped would increase, new operators may be attracted to the area, thus creating competitive price pressure.

PART 4. RESULTS

The final step in the assessment of the freight movement impacts of the proposed alternatives brings together the three analytical elements just described:

- Freight volume forecasts, by study are community
- Modal rate estimates under existing conditions
- Modal rate estimates under specified transportation improvements

To assess the cost savings achievable by making the transportation improvements proposed, one simply multiplies the forecast volume of goods for the 2020 design year by rates under existing conditions and by rates under the proposed alternatives. Put simply, the difference between these totals represents the freight movement savings achievable by implementing the proposed alternatives. Results for Scenario 1 and Scenario 2 are provided separately.

SCENARIO 1. FINAL FREIGHT MOVEMENT COST SAVINGS ESTIMATES

Petroleum Movement Cost Savings

Substantial savings in petroleum movement costs can be anticipated if Scenario 1 is implemented. Petroleum movement rates are much decreased from communities that are now particularly inaccessible, such as Chignik Lake, where the shipment rate is projected to fall from $0.60 to $0.13 per gallon. Savings are even greater in Iliamna Lake communities, such as Iliamna, where petroleum shipment costs are anticipated to fall from $0.80 to $0.15 per gallon, a greater than a five-fold reduction. The road would have the greatest freight movement cost savings for those communities that are now hardest to reach—i.e., those surrounding Iliamna Lake.

Modest savings, in contrast, are anticipated in Naknek and King Salmon. Naknek is already served directly by relatively frequent barge service, as part of the larger Bristol Bay market, which also includes communities to the north, such as Dillingham. According to this analysis, the cost of petroleum movement to Naknek is projected to fall only a few cents—from $0.30 to $0.27 per gallon.

In all, 2020 cost savings due to petroleum movement alone are estimated at $708,575 per year. Actual savings could be higher or lower, based on factors including deviations from the population base forecast; the extent to which the improvements encourage competition, which could further lower rates; and the extent to which the improvements foster other forms of economic development, such as tourism. Volume increases spurred by such development could further reduce rates. By the same token, rates could be higher than forecast if significant operating costs faced by shippers have not been taken into consideration; if operating conditions on the proposed roadway prove more difficult to manage and maintain than anticipated; and if other economic mainstays in the study area falter, reducing both population levels and the demand for goods shipment.

Beyond the shipping cost savings suggested by this analysis, other economic and social benefits would accrue through implementation of the road, in terms of petroleum shipment alone. Currently, according to Lake and Peninsula School District administrator, Dennis

Niedermeyer, the higher cost of shipping petroleum in winter months (when it must be flown into inland communities, and to Bristol Bay communities) effectively forces Southwest Alaska residents to "stock up" during the periods when petroleum can be barged in. However, communities are hard pressed to find storage capacity for all of the fuel needs, which can vary significantly by the harshness of a given winter. In his view, overtaxing fuel storage facilities creates problems in and of itself, such as fuel leaks and spills, whose cleanup is costly—both environmentally and financially. Another of the road's advantages would be reduced dependence on air shipment of petroleum products, which has safety drawbacks.

PETROLEUM MOVEMENT COST SAVINGS SUMMARY

Total petroleum freight movement cost savings achievable if the Alaska Peninsula Roadway is built are estimated at $708,600 annually (Table 20).

Table 20.
Estimated Petroleum Movement Cost Savings
Scenario 1

	2020 Forecast Consumption (gal)	Current Rate ($/gal)	Estimated Rate with Road* ($/gal)	Assumes Product Shipped through	2020 Cost Estimate Using Existing Rates ($ paid)	2020 Cost Estimate Assuming Scenario 1 is Implemented ($ paid)	2020 Savings Achievable ($ saved)
Chignik	82,787	$0.250	$0.120	Chignik	$20,697	$9,934	$10,763
Chignik Lagoon	81,967	$0.500	$0.130	Chignik	$40,984	$10,738	$30,246
Chignik Lake	145,082	$0.600	$0.130	Chignik	$87,049	$19,441	$67,608
Dillingham/Aleknagik	2,412,265	$0.300	$0.300	Williamsport	$723,680	$723,680	$0
Egegik	136,885	$0.500	$0.300	Chignik	$68,442	$41,065	$27,377
Igiugig	55,556	$0.800	$0.200	Williamsport	$44,444	$11,000	$33,444
Iliamna/Newhalen/ Nondalton	543,412	$0.800	$0.150	Williamsport	$434,730	$81,512	$353,218
Ivanof Bay	22,465	$0.270	$0.170	Chignik	$6,066	$3,707	$2,359
King Salmon/Naknek	1,124,590	$0.300	$0.270	Williamsport	$337,377	$303,639	$33,738
Levelock	113,843	$0.800	$0.23	Williamsport	$91,074	$26,184	$64,890
Pedro Bay	37,037	$0.800	$0.120	Williamsport	$29,630	$4,556	$25,074
Perryville	95,325	$0.300	$0.170	Chignik	$28,597	$15,964	$12,634
Pilot Point	94,262	$0.520	$0.250	Chignik	$49,016	$23,565	$25,451
Port Heiden	129,508	$0.350	$0.180	Chignik	$45,328	$23,311	$22,017
TOTALS					**$2,007,114**	**$1,298,539**	**$708,575**

*This cost estimate assumes that a tanker truck with a 7,500-gallon capacity is used.

"Other" Cargo Movement Cost Savings

Cargo movement savings achievable by implementing Scenario 1 are anticipated in two major areas. The first, and the primary focus of this assessment, is the savings that can be achieved in moving goods and commodities to communities in Southwest Alaska. The second, has to do with savings achievable by providing the region's gillnet fishers a more viable route between their fishing grounds in Bristol Bay, and Cook Inlet, where many store their vessels during the off-season, and where many have repair and maintenance done. These impacts are explored separately.

COMMODITIES MOVEMENT IMPACTS

Listed in Table 21 is a summary of estimated cost savings in commodities movements based on the rate calculations, and port call assumptions earlier discussed. This analysis suggests that around $9,416,200 per year could be saved in freight costs in terms of moving "Other" cargo alone, if Scenario 1 is implemented. Note that cargo shipment mode shifts under the proposed infrastructure improvements had to be taken into account in this analysis. These mode shift assumptions are documented in Table 21. These mode shift assumptions under both existing conditions and under the assumption that Scenario 1 is built are based on primary source data and area shippers' input.

A few explanations regarding the Iliamna Lake communities are needed to interpret Table 21. First, a weighted average was used in calculating the marine shipment rate under existing conditions for Iliamna Lake communities. This weighted average takes into account the percentage shipped, and rates paid, for marine freight via Naknek and Williamsport, respectively. In terms of projected rates, this analysis assumes that if the Trans-Peninsula Roadway is built, that most waterborne cargo will be shipped to Iliamna Lake communities via Williamsport.

GILLNET FLEET TRANSPORT IMPACTS

In its 1995 economic assessment, the US Army Corps of Engineers (USCOE) pointed out another area of savings that could be realized if these improvements were made. They point to the many gillnet vessels that each year make the trip from Cook Inlet to the fisheries in Bristol Bay and back. Some vessels are transported because they spend the off-season in Cook Inlet; others make the trip periodically for repairs and maintenance purposed. In all, about 825 gillnet boats are estimated to make the round trip each year.

Of these, the vast majority (about 785) sail around the Alaska Peninsula, a 1,100-mile trip that takes three days, and is estimated to cost $1,800. A small contingent (about 40), however, makes the trip via Williamsport, which is almost a thousand miles shorter and is estimated to cost about $1,233 per vessel. Although this trip is less costly in terms of both time and dollars, it is arduous, risky, and can only be undertaken during narrow time windows. Moreover, many gillnet vessels cannot be transported via this route because they are too wide to pass through existing bridges.

According to the US Army Corps of Engineers' detailed analysis, savings in the neighborhood of $1,082,500 could be achieved on the part of gillnet vessel movement alone if the Williamsport Channel were dredged, and if the existing Williamsport to Pile Bay Road and its bridges were

rehabilitated.[21] Accordingly, these estimated savings are added to the freight movement savings estimated earlier.

"OTHER" CARGO MOVEMENT COST SAVINGS SUMMARY

Total freight movement cost savings under Scenario 1 are estimated at $11,207,300. Of this total, $1,082,500 attributable to gillnet vessel transport savings. To these savings can be added $708,600 in petroleum movement savings, along with $9,416,200 in "Other" commodity movement savings (Table 22).

[21] According to the USCOE, the number of gillnet vessels taking the Williamsport route would increase from 40 to 747 round trips per year (*Navigation Channel Feasibility Report and Environmental Assessment, Williamsport*, US Army Corps of Engineers, Alaska District, December 1995).

Table 21.
Estimated "Other" Cargo Cost Savings
Scenario 1

	Mode Split and Rates Under Existing Conditions									Results		
	Marine	Air	Marine	Air	2020 Freight Volume Estimate	Barge/Road	Air	Barge/ Road	Air	Freight Costs Paid in 2020 Assuming No Change	Freight Costs Paid in 2020 Assuming Scenario 1 is Implemented	Savings Possible due to Scenario 1
	%	%	($/lb)	($/lb)	(lbs)	%	%	($/lb)	($/lb)	($)	($)	($)
Chignik	95%	5%	0.250	0.980	818,000	95%	5%	0.220	0.980	$234,357	$211,044	$23,313
Chignik Lake	10%	90%	0.500	0.980	1,434,000	95%	5%	0.223	0.980	$1,336,488	$374,059	$962,429
Chignik Lagoon	60%	40%	0.600	0.980	810,000	95%	5%	0.224	0.980	$609,120	$212,058	$397,062
Dillingham/Aleknagik	80%	20%	0.510	0.420	23,838,000	95%	5%	0.325	0.420	$11,728,296	$7,860,581	$3,867,716
Egegik	80%	20%	0.500	0.670	1,352,000	90%	10%	0.270	0.670	$721,968	$419,120	$302,848
Igiugig	60%	40%	0.765	0.390	550,000	90%	10%	0.297	0.390	$338,250	$168,465	$169,785
Iliamna/Newhalen/ Nondalton	60%	40%	0.765	0.390	5,370,000	85%	15%	0.283	0.390	$1,651	$803	$848
Ivanof Bay	90%	10%	0.700	1.090	218,000	95%	5%	0.232	1.090	$161,102	$59,928	$101,174
King Salmon/Naknek	85%	15%	0.510	0.420	11,114,000	85%	15%	0.286	0.420	$5,518,101	$3,401,995	$2,116,106
Levelock	60%	40%	0.765	0.390	1,126,000	90%	10%	0.298	0.390	$692,490	$345,907	$346,583
Pedro Bay	60%	40%	0.765	0.390	364,000	90%	10%	0.276	0.390	$223,860	$104,614	$119,246
Perryville	90%	10%	0.600	1.070	940,000	95%	5%	0.230	1.070	$608,180	$255,680	$352,500
Pilot Point	75%	25%	0.520	0.780	932,000	90%	10%	0.264	0.780	$545,220	$294,139	$251,081
Port Heiden	70%	30%	0.510	0.870	1,280,000	90%	10%	0.238	0.870	$791,040	$385,536	$405,504
TOTALS					**50,146,000**					**$23,510,123**	**$14,093,929**	**$9,416,194**

Table 22.
Scenario 1.
Freight Movement Cost Savings Summary

Petroleum	**$708,600**
Gillnet Fleet	**$1,082,500**
Other Cargo	**$9,416,200**
TOTAL	**$11,207,300**

SCENARIO 2. FINAL FREIGHT MOVEMENT COST SAVINGS ESTIMATES

If the Williamsport to Pile Bay Road were rehabilitated, in tandem with navigational improvements at Williamsport, it is estimated that most of the Iliamna Lake-bound cargo now barged up the Kvichak River from Naknek would shift to the Williamsport route. In addition, since marine transport under this scenario would be viable from June through November (a much larger portion of the year than is now the case) it is also assumed that a portion of the cargo now flown into Iliamna Lake communities would be barged, trucked, and then shipped again via Williamsport. Whereas the mode split for Iliamna Lake communities is currently estimated to be 48% marine via Naknek, 12% marine via Williamsport, and 40% air; under the proposed element of the alternative, cargo volumes are assumed to shift to 5% marine via Naknek; 65% marine via Williamsport; and 30% air.

It is estimated that these improvements would lower the cost of moving cargo to Iliamna Lake communities (via a surface route) from 37 to 24 cents per pound. When the assumed mode shift and rate values are applied to the cargo forecast volumes for the 2020 design year, savings attributable to the project can be calculated, as shown in Table 23. In all, freight movement savings achievable under this scenario are estimated at $3,149,300 per year. Because these improvements' value would be comparable to that of building the entire Trans-Peninsula Roadway system in terms of allowing gillnet fleet passage across the Alaska Peninsula, the same yearly savings can be assumed for this stand-alone element. Accordingly, $1,082,500 in gillnet fleet savings can be added to the $2,066,800 figure for "Other" cargo (Table 24).

Table 23.
Estimated "Other" Cargo Cost Savings (Scenario 2)

	2020	Mode Split, Rates and Costs Under Existing Conditions				Mode Split, Rates and Costs Under Scenario 2				
	Forecast "Other" Cargo (lbs)	Marine via Naknek	Marine via Wmsport	Air	TOTAL Freight Costs Paid	Marine via Naknek	Marine via Wmsport	Air	TOTAL Freight Costs Paid	**Savings Due to Scenario**
iugig										
Mode Split	550,000	48%	12%	40%	$367,180	5%	65%	30%	$212,438	**$154,74**
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
amna/Newhalen/Nondalton										
Mode Split	5,370,000	48%	12%	40%	$3,585,012	5%	65%	30%	$2,074,163	**$1,510,8**
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
evelock										
Mode Split	1,062,000	48%	12%	40%	$708,991	5%	65%	30%	$410,198	**$298,79**
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
edro Bay										
Mode Split	364,000	48%	12%	40%	$243,006	5%	65%	30%	$140,595	**$102,41**
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
OTALS					**$4,904,190**				**$2,837,393**	**$2,066,7**

Table 24.
Scenario 2.
Freight Movement Cost Savings Summary

"Other" Cargo	**$2,066,800**
Gillnet Fleet	**$1,082,500**
TOTAL	**$3,149,300**